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Procedures Followed in Setting Up the Long Island Chapter A.S.M.

Talks on the Establishment of the Long Island Chapter of the American Society for Metals, Presented at the Annual Chapter Chairmen's Breakfast During the National Metal Congress in Philadelphia, Pa., on Oct. 19, 1955

By JOHN P. NIELSEN

Almost a year and a half ago the executive committee of the New York Chapter was approached by three members of the Chapter, Messrs. Rogers, Platz and McCullough, to the effect that a discussion of about 25 members living in Long Island had indicated a desire to form an A.S.M. chapter of their own in Long Island. The reasons given were that there was a significant industrial growth on the Island, and a corresponding growth of A.S.M. membership in that area. Furthermore, the Long Island Railroad lived up to its reputation of discouraging people from commuting to Manhattan.

The Executive Committee, under Walter Stadtler, chairman of New York Chapter at that time, took up the matter and discussed several aspects of the problem. A number of years ago the Chapter had approved the Newark Chapter, which has grown to be a major chapter on its own since then, and so the success of this move certainly suggested that this request for a Long Island Chapter be given serious consideration. The attendance at the New York meetings of the Long Island members was low, and therefore, it was appreciated that the commuting was a serious barrier to membership participation in the Chapter's activities. A check on the possible switch to a Long Island Chapter indicated about 20% of the New York Chapter membership, or about 200. There was also the serious question of financial support and organization assistance. Walter Stadtler, in general sympathy with the whole idea, persuaded the executive committee to set up a Long Island Activities Committee with Herbert Kalish as chairman, he being both a Long Island resident and a member of the New York Chapter executive committee. He was to work out the rough details for setting up the new branch, as it was unofficially called. The Long Island Branch was authorized to go ahead with their own meetings and to submit a budget which the New York Chapter would underwrite.

The follow-up of this move was the initiation of correspondence with the Cleveland office and Secretary W. H. Eisenman arranged for a meeting of the New York Chapter officers and the three principally interested members in Long Island. The note of good will on all sides was apparent at this meeting and so general approval was given to the program of the Long Island Activities Committee. The Cleveland office contributed $100 to the budget of this committee.

The budget requested by the Long Island Branch was for $650 and an appropriation for this amount was granted by the New York Chapter. In the meantime, a program of meetings was set up and printed in the New York Chapter yearbook. The meetings were overwhelmingly successful. Attendance ran up to 200, three times that of the New York Chapter. This indicated that the grass roots aspect of chapter activity is very important. At any rate, it was quite natural that the branch would press for full chapter status, which they did. Incidentally, it was realized on both the chapter and the branch sides that a Long Island Chapter would be started without the New York Chapter's sanction merely by the technicality of 25 members interested in doing so. It is a credit to the Long Island Chapter branch that they did not choose this path which would have probably resulted in a distant relationship between the two groups.

At any rate, last April 4, the Long Island committee representatives and the officers of the New York Chapter had a joint meeting at which they made a declaration of intent to form the Long Island Chapter.

By HERBERT S. KALISH

I am indeed pleased and grateful to have this opportunity to present to you the story of the formation of the Long Island Chapter A.S.M.

You have just heard from John Nielsen about the interests which stimulated action for the formation of this Chapter.

My first knowledge of this interest came at an executive committee meeting of the New York Chapter. I was frankly skeptical that sufficient interest really existed in the Long Island area, since we drew practically no people from that area to our A.S.M. meetings.

However, I was appointed chairman of a Long Island Activities Committee, the purpose of which was to establish an A.S.M. program in the area, under the auspices of the New York Chapter.

I had a meeting with Walter A. Stadtler, who was then chairman of the New York Chapter, Ludwig Anselmini, secretary of the New York Chapter, and the three Long Island A.S.M.'ers who were instrumental in initiating A.S.M. activity on Long Island, William Rogers, Robert Platz and Harold McCullough.

At that meeting we thrashed out a committee which consisted of a chairman, vice-chairman, secretary, treasurer and an executive committee. It seemed expedient and logical that William Rogers should be vice-chairman, Harold McCullough secretary and Robert Platz treasurer. We also decided upon men who would act as chairmen of the program, publicity, by-laws and membership committees.

Positive action was required to get the ball rolling. We first met on June 9, 1954, with the intention of setting up a program for the Fall. Our finances had to be closely watched and we established a budget which was presented before the New York Chapter. We were to receive $100 from National Headquarters and asked the New York Chapter for $650. This sum seemed adequate to cover our expenses and seemed to be a reasonable request, in view of the approximately 200 members who were alleged to be in the Long Island area and who would benefit from this activity.

It was a rough summer—selecting a meeting place, arranging a program and deciding on the various other activities. We had many meetings of the executive committee of the Long Island group. The meeting place was selected for central location as well as for its attractive environment and good food.

We decided to have a program of only five regular meetings and no other activities. Society headquarters was very helpful. We had the retiring National President, J. B. Austin, at our first meeting and George Roberts, then national president, at our April meeting.

Our announcements were mailed to approximately 500 people, about two-thirds of whom were A.S.M. members. Aside from some hectic moments in making all our meeting arrangements, we had splendid success. Attendance at meetings varied from 90 to 130 members.

After we had just about started, we had to make a decision on whether or not to form a new chapter. It was a difficult decision to make since members of the Long Island Activities Committee had divided opinions on this matter. I believe that it was

in the best interest of A.S.M. that we form a separate chapter, for the following reasons:

Arrangements with New York had been very amicable but sooner or later a financial harangue would take place if we continued to go to New York for money. Since we had no idea about the membership, there was no realistic way in which we could select our officers and executive committee and in which we could have a true vote on these officers. I was also afraid that the Long Island membership would lose interest if a chapter were not formed.

It was decided to have a vote from the floor at our regular meeting on Jan. 26, 1955, to see what the general feeling was on this matter. At that time, when asked how many people were interested in forming a new chapter, perhaps less than half of those present stood up in favor. I then asked how many favored our remaining as a section of the New York Chapter. No one stood up. Thus, it was concluded that if any decision could be reached, it had to be in favor of the formation of a new chapter.

Perhaps the most important item in the entire arrangement was the splendid cooperation of the New York Chapter in sending out to the entire A.S.M. New York membership an announcement, with a reply card attached, that a Long Island Chapter was going to be formed. Those who signed the card and returned it would become members of the Long Island Chapter when formed. It was surprising how well this worked. We got the geographical location we expected and we avoided the problem of deciding on exact boundaries.

The Long Island executive committee had a contingency at the time which stipulated that we would go ahead and form the Long Island Chapter only if at least 120 cards were returned in the affirmative. We received 193 replies and these represented the original membership.

Among the most important things in the amicable arrangements of the formation of this Chapter were the three meetings between the officers of the Long Island Activities group and the officers of the New York Chapter. At these meetings decisions were made, contingent, of course, on approval by the executive committee, but which permitted many matters to be cleared away in the most agreeable fashion. For example, when we received our Charter on Apr. 27, 1955, we were broke! You are all familiar with the way in which the members' dues are rebated to the local chapter. This is a primary source of funds. There would be Long Island members who had just paid their dues in March or April and this money would accrue to New York. New York realized that Long Island needed money to get started and that they were, in fact, entitled to some financial help from the parent chapter. Many attempts were made to work out a suitable formula for this financial arrangement. It was finally decided that the Long Island membership was about 200 and that approximately three-quarters of the total dues accrued to New York over the year should go to Long Island. This was a most generous arrangement but it represented money (very much needed by a beginning Chapter) which was being received from the parent chapter. In addition, we must consider the fact that many of the Long Island members had for many years no benefit from their dues, which had accrued to the parent chapter.

Now that the separate chapter is formed, we are trying to maintain many cooperative ventures with the New York Chapter. We have a joint yearbook and announce each other's meetings in our regular mailings. There are problems to be worked out in these cooperative ventures but I am optimistic about the future, particularly in view of the liaison arrangement we have agreed upon between the two groups. A liaison man was appointed from the executive committee of the Long Island Chapter to sit in on the New York executive committee meetings. The following year, a man from the New York executive committee will be assigned to sit in on the Long Island Chapter executive committee meetings.

As far as the Long Island Chapter itself is concerned, the strength of the group is unusual. We had 207 members, including 11 sustaining members, at the time of our meeting of Oct. 5, 1955, and 117 people were present for dinner, 140 for the talk that evening. Attendance at New York meetings has not suffered in any way and I think that, in fact, the general increase in A.S.M. activity in the area will help stimulate the parent chapter.

I am not too familiar with how other chapters were formed, but I could ask for no better way than we had in the formation of the Long Island Chapter. Perhaps the big factor was the spirit of cooperation of the parent chapter in appointing a man from their executive committee, neutral in position regarding the formation of the new chapter but willing to work toward that end.

If it appeared that the interest did not exist in Long Island, the formation of the chapter could have been dropped. This may happen at times but, with the growth of A.S.M., it seems unlikely. If other chapters adopt this procedure, it seems certain that new and thriving chapters can be formed in many areas where they are needed to best get active participation on the local level from A.S.M. members.

All of you, as chapter chairmen, know full well that the dynamic success of this chapter formation which took place in a year could not have been done without the co-operation of many men who had ability and were willing to work, no matter how valuable their time was. Men of high caliber are available in all A.S.M. chapters. We were fortunate enough to find many of them at the outset and these men are building a firm chapter foundation.

TO: *New York Chapter Members*

The Long Island Activities Committee of American Society of Metals, with the cooperation of the New York Chapter, is now planning to form a Long Island Chapter.

If you are interested in the formation of this new chapter, and wish to transfer your membership to the Long Island Chapter, please sign the attached card and mail it before Mar. 1, 1955.

The signing of this card will constitute your authorization for A.S.M. National Headquarters to transfer you to the new Long Island Chapter when it is formed.

This notice is being sent to all New York A.S.M. members so that the drawing of arbitrary boundary lines can be avoided. Return the card only if you are interested in transferring your membership to the Long Island Chapter when it is formed.

H. S. Kalish, Chairman, Long Island Activities Com.
W. A. Stadtler, Chairman, New York Chapter

Date: _____

I wish to transfer my local American Society for Metals membership to the Long Island Chapter when it is formed.

NAME: _____
(Please Print)

MAILING ADDRESS: _____

_____

SIGNED: _____

Log of Events in the Formation of the Long Island Chapter

Date	Type of Meeting	Result
Apr. 20	(Letter)	Request by five A.S.M. members for permission to undertake educational and associated activities in the Long Island area, this group function to be operated as a Long Island Activities Committee of the New York Chapter; and for the New York Chapter chairman to appoint a chairman of the Long Island Activities Committee.
Apr. 27	New York Chapter Executive Committee Meeting	Motion passed (1) to encourage the above proposal, (2) that the incoming chairman of the New York Chapter appoint a chairman of the Long Island group, and (3) that financial backing be offered to them, subject to the prior approval of the New York Chapter executive committee.
May 12	Special meeting attended by George Roberts, National President A.S.M.; Bill Eisenman, Secretary A.S.M.; the officers of the New York Chapter; and three of the five Long Island members who signed the letter of Apr. 20, 1954	Dr. Roberts and Mr. Eisenman agreed whole-heartedly with the New York Chapter proposal to sponsor the Long Island Chapter.
May 27	New York Chapter Executive Committee Meeting	Walter Stadtler, New York Chapter chairman, announced the appointment of Herbert Kalish, member of the New York executive committee, as chairman of the Long Island Activities Committee.
June 9	Special meeting of officers of the New York Chapter and the Long Island Activities Committee	Framework of the Long Island Activities Committee organized.
June 23	First meeting of the Long Island Activities Executive Committee	Program of meetings organized.
June 30	New York Chapter Executive Committee Meeting	Long Island Activities Committee budget presented and approved by the New York Chapter.
July 21	Long Island Activities Executive Committee Meeting	Decision made to send notice of regular meetings to all prospective members, as well as A.S.M. members, in the Long Island area.
Nov. 11	Long Island Activities Executive Committee Meeting	By-Laws Committee assigned to make recommendations on future status of the organization and to give a report thereon.
Jan. 18	Special Meeting of officers of the New York Chapter and Long Island Activities Committee	Decision made to ask for a standing vote of interest in forming a chapter, or remaining as a section of the New York Chapter, at the regular Long Island Jan. 26, 1955, meeting. Plan set up to send letter to all the New York membership to expedite transfer to the Long Island Chapter, when formed. (See form letter, p. 5).
Jan. 26	Regular meeting of Long Island Activities Committee	Vote taken indicated no interest in remaining as a section of the New York Chapter, but definite interest in the formation of a new Long Island Chapter.
Feb. 7	Long Island Activities Executive Committee Meeting	Decision to form a chapter only if more than 120 affirmative replies received to the announcement letter of Feb. 7, 1955. If fewer than 120 replies were received, the matter would be taken up for advisement by the Long Island Activities Executive Committee.
Mar. 23	Regular meeting of the Long Island Activities Committee	Since 193 affirmative replies had been received, a petition to form a new chapter was circulated.
Mar. 26	Special meeting of the officers of the New York Chapter and the Long Island Activities Committee	Plans were made for separation of the Long Island Chapter from the New York Chapter, including financial arrangements in which the Long Island Chapter would receive $525 (three-quarters of the portion of 200 members' dues accrued to the New York Chapter over the previous year).
Apr. 4	Letter—Petition	Walter Stadtler, chairman of the New York Chapter, submitted the petition for the formation of the Long Island Chapter. This contained 91 signatures of bona fide A.S.M. members.
Apr. 27	Regular meeting of the Long Island Activities Committee	Charter for the new Long Island Chapter presented by President George Roberts.

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Materials for Atomic Energy Plants Outlined At Puget Sound Chapter

Speaker: William R. Smith
General Electric Co.

William R. Smith of General Electric Co.'s Hanford Atomic Products Operation and chairman of the Columbia Basin Chapter, delivered a lecture on "Materials for Atomic Energy Plants" at a meeting of the **Puget Sound Chapter.**

The metallurgical problems associated with operations of an atomic energy plant are very similar to those of any other industrial plant. The main consideration of materials used in reactor operations is corrosion. Consideration is also given to the effects of atomic fission upon metallic materials, but there are still many "educated guesses" used in the fabrication of reactor sections. The most important consideration is its ability to do the job for a continuous operation; cost is a secondary factor.

Materials generally used in reactor construction are cast iron, steel, aluminum, austenitic stainless steel, concrete and graphite. Types 304-L and 347 are the most used stainless steels in separation plants. Most materials are procured through A.S.T.M. standards. The testing of materials requires special and elaborate consideration, and, in many instances, can be conclusively evaluated only on finished equipment in pilot plants.

The fabrication of reactor component parts is similar to fabrication of like materials in any manufacturing operation. In some parts, such as in a heat exchanger, fabrication presents a problem as no "pockets" or crevices can be present which would tend to aggravate corrosion.

Within the reactor cycle, no corrosion products or additives can be allowed, as unnecessary absorption of neutrons by foreign materials in the fission process may decrease the efficiency of the nuclear reaction or radio-actively contaminate the water. Absorption of neutrons makes additional problems for the water purification process. The water must not be contaminated as it is returned to the river. Additives or corrosion products must not form a film on the fuel elements. Many pieces of equipment once installed cannot be disassembled for repair or even inspection because of the radiation hazard. The continuity of operation for an almost indefinite period is a must.

As to the future of materials in corrosive and atomic radiation atmospheres, many studies of these conditions are now in progress but much more work of this nature is needed. New materials are constantly being tested but at present stainless steels and aluminum are still best for most uses.—**Reported by Ed Murray for Puget Sound Chapter.**

Presents Corrosion Problems at K.C.

Ed Weisert (Left), Haynes Stellite Co., Presented a Talk on the "Principles of Corrosion" at the First Meeting Held by Kansas City Chapter This Season. He is shown with R. R. Griner, chairman of the Chapter

Speaker: E. D. Weisert
Haynes Stellite Co.

E. D. Weisert of the Haynes Stellite Co. presented a thorough analysis on the cause of corrosion and the ways and means available to metallurgists for overcoming this costly phenomenon at a meeting of the **Kansas City Chapter.** In his talk, entitled "Principles of Corrosion", Mr. Weisert pointed out that corrosion in its various forms costs the United States $6-billion per year.

Mr. Weisert went on to say that corrosion, simply defined, is the tendency of the metal to return to its original state. A series of many excellent slides showed graphically the various forms corrosion takes—stress corrosion, anodic, oxidation, temperature and pressure. To eliminate corrosion the engineer should consider the contemplated use of the article and then apply one or more of the following techniques — change environment, coat, cathodic protection (electronic or sacrificial), or use of more corrosion-resistant material.

The proper selection and combination of engineering materials was considered to be one of the most effective. However, to select the proper scheme, it is mandatory to base the analysis on experimental procedures which consider all variables.

Prior to the meeting it was announced that Kenneth Rose, department of metallurgical engineering, University of Kansas, had been awarded the A.S.M. $2000 Metallurgy Teaching Award for 1955, and that one of his sophomore metallurgical students, James Jellison, had been granted a $25 prize.—**Reported by D. C. Goldberg for Kansas City.**

Metallurgy of Gray Iron Discussed at Chattanooga

Speaker: D. E. Krause
Gray Iron Research Institute

The **Chattanooga Chapter** heard a talk on the "Metallurgy of Gray Iron and Its Heat Treatment" by D. E. Krause, technical director of the Gray Iron Research Institute.

Mr. Krause described gray iron as a material relatively low in ductility but whose engineering properties make it an important ferrous alloy. Exclusively a foundry metal, it can be melted in large tonnage in a small working space. It is cheap to produce, and its properties of good wear behavior and good machinability lead to its wide use in the automotive industry.

Mr. Krause used slides to show as-cast structures of gray iron and how its properties, such as strength and impact strength, vary with chemical analysis and ladle treatment. The most desirable structure is one having small graphite flakes in a pearlitic matrix which gives high strength and a good machined surface. Mr. Krause stressed the difficulty of securing agreement on chemical analysis of gray iron without proper sampling methods and methods of analysis suitable for gray iron determinations.

In discussing heat treatment of gray iron, Mr. Krause referred to stress relieving at 900 to 1100° F., flame hardening, annealing for machinability, induction hardening and heat treatment of gray irons to be used in high-temperature service. —**Reported by J. H. McMinn for Chattanooga Chapter.**

Congratulates Teaching Award Winner

Kenneth E. Rose (Left), Professor of the Department of Metallurgical Engineering, University of Kansas, Is Shown Receiving the Congratulations of R. R. Griner, Chairman of the Kansas City Chapter, For His Winning of the A.S.M. $2000 Metallurgy Teaching Award for 1955. Professor Rose has been an active worker for the Kansas City Chapter in the field of metallurgical engineering far beyond the requirements of his position at the University. (Reported by D. C. Goldberg)

At Washington's Quench and Draw Party

A Representative Group of the Guests Who Attended the Annual Quench and Draw Party Held by the Washington Chapter Seem to be Having a Good Time

The **Washington Chapter** held its annual "Quench and Draw" party at historic Potomac Boat Club. This stag event, which initiated the Chapter's 1955-56 season, was attended by over 150 members and guests.

Activities included professional entertainment, a buffet dinner, and quiz contests and drawings for many prizes donated by the Chapter's sustaining members.

The popularity of this affair is indicated by the action of G. Willard Quick, a retired metallurgist, who made the trip from Miami, Fla., to Washington, just to attend the party. **—Reported by H. P. Weinberg and H. Stern for Washington.**

DoAll's Exhibit Shown at Joint Minnesota Meeting

Speaker: C. G. Schelly
Wilkie Foundation

The **Minnesota Chapter** A.S.M. and Twin City Chapter **A.F.S.**, heard C. G. Schelly, managing director, Wilkie Foundation, explain and demonstrate the DoAll Co.'s exhibit, "Civilization Through Tools", a complete and documented story of basic tools made and used by man during a period of one million years.

The exhibit presented the evolution in man's tools in chronological sequence. Bone tools descriptive of man at the threshold of progress, crude stone implements having a recognizable shape and showing evidence of use, and stone implements fashioned to obtain sharp edges, led up to the point where man's progress suddenly took a big jump as he decided to fashion tools for a specific purpose, changing the shape of his tools accordingly.

Succeeding displays showed how man combined two or more elements to improve the efficiency of his tools by fitting handles to flaked sharp stones to produce axes, spears, etc., then carried man's evolution through the age of copper, bronze and iron.

Modern civilization was introduced by displays of exact-scale working models of the first machine tools, which were instrumental in freeing men from arduous physical exertion since they guided tools by mechanical forces rather than by muscle power. The story of this development—the basis of our modern economy—was augmented in a following display panel which described Eli Whitney's concept of mass production through interchangeable parts. This display presented authentic Whitney muskets manufactured under this plan.—**Reported by Henry Davis for Minnesota.**

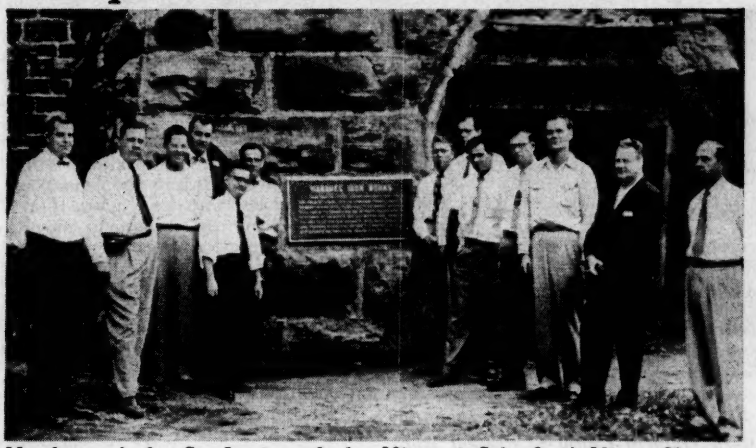
Panel Discusses Quenching Methods at Hartford Chapter

A panel of experts on "Quenching", including W. E. Bancroft, chief metallurgist, Pratt & Whitney Division, Niles-Bement-Pond Co., R. J. Haigis, laboratory director, Stanley Works, Henry Hubbell, chief metallurgist, Fafnir Bearing Co., and J. A. Swift, president, Swift Industrial Chemical Co., was featured at a recent meeting held by the **Hartford Chapter.**

Mr. Bancroft discussed the quenching of high-speed and other toolsteel; Mr. Haigis covered martempering quenches; Mr. Hubbell went into the aspects of normal types of quenching using brine, oil and water; and Mr. Swift described the effects of alloys on altering the isothermal transformation curves.

Paul C. Farren, chief metallurgist of the Hartford Machine Screw Co., was technical chairman.—**Reported by G. W. Hunt for Hartford.**

Chapters Visit Historic Blast Furnace



Members of the St. Louis and the Missouri School of Mines Chapters Are Shown at the Site of the First Blast Furnace West of the Mississippi River During a Recent Joint Meeting Featuring the "Production of Uranium"

Speaker: John A. Fellows

Mallinckrodt Chemical Works

The joint meeting of the **St. Louis and the Missouri School of Mines and Metallurgy Chapters** featured a full day of activities, including a golf tournament, a field trip to the first blast furnace west of the Mississippi River, and a banquet, during which John A. Fellows, Mallinckrodt Chemical Works, discussed the "Production of Uranium".

The golf tournament was a somewhat informal affair, with George A. Fisher, past-chairman of the St. Louis Chapter, defending his championship. Those members who elected the field trip to the famous Meramec Iron Plantation, erected in the 1830's, all agreed that the physical effort exerted in this safari was worthwhile.

Dr. Fellows, the banquet speaker, emphasized the role that quality played in the production and in the purification of uranium oxide in the early days of the Manhattan project.

The Mallinckrodt Chemical Works was selected early in 1942 for the first attempt to purify uranium dioxide in quantity. A laboratory procedure was modified for production purposes and within three months an output of 30 tons per month of high-purity UO_2 had been achieved.

From this beginning, the production of uranium was rapidly expanded in the latter half of 1942, and the production of metal was added and was also begun at several other sites. The first reactor, however, constructed at Chicago, was built with uranium oxide prepared by Mallinckrodt.

Following the end of the war, metal production was centralized at the company and new facilities put into operation in 1946. Since that time, the capacity has been expanded with an Atomic Energy Commission investment to date in the neighborhood of $25,000,000.

Ores from many parts of the United States, from Canada, Australia, Belgian Congo, and assorted sources are used at Mallinckrodt. Raw material is received as a concentrate containing 60 to 80% uranium. This is refined by a nitric acid digestion, and is subsequently treated by a di-ethyl-ether extraction to provide an extremely pure uranyl-nitrate-tetrahydrate.

The standard procedure is to boil this down to a nitrate powder, which is then treated in a special furnace with hydrogen to form UO_2 and finally with anhydrous HF to create UF_4, frequently called "green salt". The next step is the production of metallic uranium by an exothermic reaction with magnesium. This is finally remelted and cast into ingots for subsequent fabrication to fuel elements for use in the reactors.

This operation in St. Louis is shortly to be augmented by the addition of a new plant west of the Missouri River at Weldon Spring Ordnance Works. The A.E.C. is about to spend something in the order of $33,000,000 for the construction of this plant. Some of the operations should begin early in 1957 and it is planned to have the plant in complete operation by the middle of that year.

As a part of the development laboratories, an expanded metallurgical development unit will be concerned with a variety of phases, and will have complete metallographic facilities and the usual equipment and apparatus for all types of mechanical testing. This work will be concerned with development of fabrication techniques and control of quality, and at the same time will be concerned with the investigation of structure, allotropic transformations, alloy modifications, and other aspects of physical metallurgy that have a bearing on the creation of high-quality fuel elements.—**Reported by D. S. Eppelsheimer for Missouri School of Mines and St. Louis.**

Visit Mining Operation, Hear Welding Talk at Minnesota

Speaker: A. L. Schaeffler

Allis-Chalmers Manufacturing Co.

A joint meeting of the **Minnesota Chapter** A.S.M. and the Engineers' Club of Northern Minnesota featured a field trip sponsored by the Oliver Mining Co., through the taconite rock open pit mines.

Anton L. Schaeffler, metallurgist in welding research, Allis Chalmers Manufacturing Co., presented an informative talk on the "Metallurgy of Welding", with specific reference to problems in abrasion, after a dinner following the tour.

Mr. Schaeffler described metallurgical changes that occur during the welding of mild, low alloy, stainless and dissimilar steels. Principles of hard facing and welding dissimilar metals were outlined.—**Reported by Henry Davis for Minnesota Chapter.**

Notch Sensitivity Topic at N.W. Pa.

J. D. Lubahn, Research Laboratory, General Electric Co., Opened the Technical Season for the Northwestern Pennsylvania Chapter With a Talk on "Notch Sensitivity and the Size Effects". Shown at the meeting are, from left: G. E. Mohnkern, secretary-treasurer; J. F. Curley, program chairman; Mr. Lubahn; and E. E. Hall, chairman. Representatives of Turco Products, Inc., presented a film on "Penetrant Inspection Techniques" following the talk. (Reported by E. E. Greene for N. W. Pa.)

Speaks on Cast to Shape Toolsteels

E. Ghrist, Chief Metallurgist, Jessop Steel Co., Spoke on "Cast to Shape Toolsteels" at a Meeting of the Western Ontario Chapter. Present were, from left: G. Halliday, Windsor Tool and Die, technical chairman; T. N. Thomas, Jessop Steel Co.; Mr. Ghrist; and T. F. Heard, past-chairman

Schaefer Guest of Milwaukee Chapter

National President A. O. Schaefer, Vice-President, Engineering and Manufacturing, Midvale Co., Who Spoke on the "Application of Emergency Metallurgy to Peacetime Use" at a Meeting of the Milwaukee Chapter, Presents 25-Year Membership Certificates to Silver Jubilarians John McBroom (Center), and Babcock & Wilcox Co., Represented by Elmer Gammeter

Bronze Alloys Subject at Tulsa

"Bronze Alloys for the Occasional Metallurgist" Was the Subject of a Talk Given by R. J. Severson, Assistant General Sales Manager, Ampco Metal, Inc., at a Meeting Held by Tulsa Chapter. Present were, from left: G. R. Clay, vice-chairman; Mr. Severson; and Paul Ogden, Chapter chairman

Cleveland Meeting Features Panel on Heat Treating

A panel-type meeting which was held by the **Cleveland Chapter** on the subject, "Heat Treating of Production Steels", was introduced to the membership with the question: "Have you any heat treating problems?"

The moderator, who proved well able to keep the questions moving at a lively pace, was R. G. Kennedy, Jr., manager, metallurgical research, Cleveland Twist Drill Co. Panel members were: R. L. Elliott, metallurgical section supervisor, Thompson Products, Inc.; T. A. Frischman, chief metallurgist, axle division, Eaton Manufacturing Co.; J. R. Gier, Jr., president, Ferrotherm Co.; J. A. Sindelar, president, General Metal Heat Treating, Inc.; E. B. Hauser, metallurgist, Weldon Tool; and C. C. Dick, chief metallurgist, Oliver Corp.

Some of the questions which were directed at the panel and their answers included the following:

What is the best stop-off plating for nitriding? Mr. Elliott expressed his preference for tin plate first and copper plate second, explaining his reasons for the preference.

When should martempering be used? Mr. Frischman explained how the treatment is used to control distortion.

What is the purpose of triple tempering? Mr. Hauser explained that it is an old practice used to extend the safety factor.

What value is the file in checking hardness? Mr. Gier stated that, not only does it indicate the amount of retained austenite, it also checks wearability.

What maximum hardness can be used with a carburized case? Mr. Dick explained that it depends on the final use of the part.

Compare the controlled atmosphere hardening of toolsteels with the salt bath method. Mr. Sindelar explained how the salt bath minimizes straightening costs and several other of its advantages.

The program ended with a lively discussion of the use of ultrasonics in heat treating.—**Reported by J. J. Glubish for Cleveland Chapter.**

Fetters Guest at Birmingham

Speaker: Karl L. Fetters

Youngstown Sheet & Tube Co.

Members and guests of the **Birmingham Chapter** heard Karl L. Fetters, Youngstown Sheet & Tube Co., and a trustee of A.S.M., present an address entitled "Steelmaking Developments During the Past Decade".

After outlining advances in the steelmaking industry, Dr. Fetters also discussed the highlights of his European trip to the Joint Metallurgical Societies Meeting in June.—**Reported by D. C. Bertossa for the Birmingham Chapter.**

Receive Past-Chairman Certificates at Saginaw

Past Chairmen Who Received Certificates at a Meeting of Saginaw Valley Chapter Included, From Left: C. M. Campbell, J. H. Loree, R. J. Griffen, H. W. Schmidt, A. G. Spencer, R. S. Haverberg, F. L. Mackin, A. A. Moore, T.E. Leontis, Present Chairman, and F. A. Simons. They heard A. M. Aksoy speak on "Vacuum Melting"

Atmospheres for Heat Treating Is Topic at Calumet

Speaker: N. K. Koebel

Lindberg Engineering Co.

N. K. Koebel, manager, heat treating furnace division, Lindberg Engineering Co., presented a talk on "Prepared Atmospheres for Heat Treating" to a meeting held by the Calumet Chapter.

Mr. Koebel limited his talk to the advancements made in manual and automatic control of furnace atmospheres for the processes of neutral hardening of tool and production steels, carbon correction, carburizing and carbonitriding. Since the endothermic type of generator is universally used by industry to furnish the basic or carrier gas for all of the mentioned processes, the flow diagram and principle of the endothermic gas cracking process were carefully explained so that the factors to be controlled could be understood. It was shown that, by means of a micrometer adjustment on the carburetor, the air-gas ratio could be varied to increase or decrease small amounts of water vapor and carbon dioxide in the basic atmosphere of 40% hydrogen, 20% carbon monoxide, 0.5% methane, and balance nitrogen, to be in equilibrium with steel of any carbon content.

Mr. Koebel showed that the control of the atmosphere could be based either on carbon dioxide or water vapor. Since no low-price instrument was available to measure carbon dioxide in hundredths of a percent water vapor in terms of dew point was chosen as the constituent to be measured.

Dew point cups to measure 0.1 and 0.01% water vapor can either be home made or purchased for as low as $20. The most accurate dew point indicator, especially in the low dew point range, can measure dew points accurately from −80° F. to room temperature without the need of a refrigerant. This unit, known as the "Alnor Dewpointer", can be purchased for approximately $300. The automatic, continuous recording of dew point becomes more complicated and, therefore, costlier; units range from $1500 upward.

Dew point versus carbon content equilibrium curves were shown for plain carbon, production steels and highly alloyed toolsteels. Mr. Koebel explained how to use the curves to control the processes of neutral hardening, carburizing, carbon correction and carbonitriding. The equilibrium curves shown were developed by Mr. Koebel experimentally because he found that the theoretically calculated curves did not agree with the results obtained on plain carbon steels and were greatly inaccurate for the highly alloyed toolsteels.

Industry is now demanding automatic control of furnace atmospheres to meet the increasing rigid specifications of hardening and carburizing. To meet this end, Mr. Koebel stated that his company has developed the Carbotrol, an instrument to automatically control and record the carbon potential of the furnace atmosphere. The instrument works on the principle of continuously recording and controlling the dew point of the furnace atmosphere. Equilibrium curves are used to set the instrument to control and record the carbon potential for any steel.

During the past year, more than 20 instruments have been installed throughout the country on processes of controlling neutral hardening of production and toolsteels, carbon correction of aircraft bolts, carburizing to specified carbon levels and carbonitriding to specified carbon levels. The same basic instrument can be used for all processes. The cost of automatic controlling and recording has been reduced during the last year due to research and development improvements and a volume increase in sales to permit mass production in the shop rather than building units one at a time in the development department. A unit to continuously record and automatically control a single furnace now sells for approximately $2600. If two furnaces, or a furnace and a generator are to be controlled, some of the components can be combined and the cost can be lowered to $2000 for each controlling and recording point.

Mr. Koebel pointed out recent developments in furnace design which permit closer control of furnace atmospheres. One such development is the new gas-fired, vertical radiant tube. This tube is made of extruded wrought alloy of one-piece construction. The tube is coated on the inside and outside with a high-temperature enamel to prevent the alloy from carburizing or oxidizing.

Another development which permits electric furnaces to be designed more efficiently for carburizing and carbonitriding is the "Corrtherm" heating element. This electric element can operate in the presence of soot without shorting or burning out. An extremely low voltage, 6 to 12 volts, is used in a corrugated sheet element that covers most of the furnace walls. The corrugated sheet element is protected on both sides against carburizing or nitriding by the high-temperature aircraft enamel.

During the remainder of the lecture, Mr. Koebel showed illustrations of interesting installations of gas carburizing, carbon correction, carbonitriding and neutral hardening atmosphere processes.—**Reported by T. W. Howlett for Calumet.**

As an indication of the tremendous dissemination of engineering information, a compilation shows that in one year the ⬢ collected, edited, published and distributed over *one hundred million pages* of metallurgical information.

Explains Vacuum Melting Techniques

A. M. Aksoy (Right), Chief Metallurgist, Vacuum Metals Corp., Spoke on "Vacuum Melting" During a Recent Meeting Held by the Saginaw Valley Chapter. He is shown with T. E. Leontis, the chairman of the chapter

Speaker: A. M. Aksoy

Vacuum Metals Corp.

At the first meeting this season of the **Saginaw Valley Chapter,** A. M. Aksoy, chief metallurgist, Vacuum Metals Corp., presented a talk on "Vacuum Melting".

Dr. Aksoy discussed the general applications of vacuum techniques in metallurgical processing and, specifically, vacuum melting. He pointed out that there are three types of vacuum melting processes, induction vacuum melting, arc vacuum melting and vacuum degassing. He then confined his talk primarily to the induction vacuum melting process. With the use of slides, he explained the equipment used in the process, the reactions which take place and compared the physical properties of vacuum melted with conventionally melted material.

Following a question and answer period, a color movie entitled "Operation Greenhouse" was presented. The movie showed the preparation for the Eniwetok A-bomb tests, the actual blasts and their effects on military equipment and structures.—**Reported by E. L. Mannings for Saginaw Valley.**

Outlines Properties and Uses of New Group of Alloys

Speaker: H. F. Reid

McKay Co.

At a meeting of the **Columbia Basin Chapter** H. F. Reid, manager, McKay Co., technical service division, spoke on "Austenitic Chromium-Manganese Stainless Steel".

Mr. Reid described the properties and potentialities of a new group of alloys on which considerable developmental effort is being expanded and which may eventually replace chromium-nickel alloys for many uses, although at the present time these alloys are used primarily for welding rod. The alloy additions to these steels are in the proportion 16% Cr, 1% Ni, 16% Mn, in which the nickel is necessary at this stage of development to improve formability in fabrication. The mechanical properties achievable in this series of alloys are, in general, better than standard 308 and 310 welding rod in use today, and their corrosion resistance is comparable to 302 stainless. Work hardening characteristics are comparable to similar materials, however, wear-wise it appears to be superior to existing alloys. The crack-susceptibility of this material in the form of a weld, measured by inspection of the bead between butt-welded plates rigidly spaced previous to welding, is similar to that of rod used for welding armor plate. Mr. Reid forecast that this chromium-manganese alloy will find particularly beneficial application in the welding of dissimilar alloys and in service where high impact strength and abrasion resistance are required.

Speaks on Heat Treatment Of Steel at Quebec Meeting

Speaker: S. Gertsman

Dept. of Mines & Technical Surveys

Members of the **Quebec Chapter** heard a talk by Sol Gertsman, Physical Metallurgy Division, Mines Branch, Department of Mines and Technical Surveys, Canada, on the "Heat Treatment of Steel".

Mr. Gertsman described the theory and practice of heat treatments which were designed to produce required mechanical properties by developing the appropriate microstructures. The significance of S-curves and their very practical application to a number of everyday heat treatment problems was discussed. One example was the substantial economy in furnace time made possible by isothermal annealing. Mr. Gertsman described the effect of internal stresses in producing cracking in heat treatment and the effect of treatments, such as martempering, in minimizing these. He also discussed critical cooling rates and the role of alloying in developing increased hardenability.—**Reported by J. E. Chard for Quebec Chapter.**

J & L Honors A.S.M. Long-Time Member

Shown at the Ribbon-Cutting Ceremony Which Opened the New Jones & Laughlin Steel Corp. Research Laboratory in Pittsburgh Are, From Left: Harold T. Clark, Director of Research; E. D. Reeves, President, Industrial Research Institute and Executive Vice-President, Esso Research and Engineering Co.; Herbert W. Graham, Consultant to the President and Former Vice-President, Research; and Admiral Ben Moreell, Board Chairman. The research building was named the Graham Laboratory for J&L Research in honor of Mr. Graham who for over 40 years has been a leader in steelmaking advances at J. & L. Mr. Graham is a member of Pittsburgh Chapter

Small Business Potential Subject at Inland Empire

Speaker: Gordon P. Hawkins

Rainway Irrigation Co.

Gordon P. Hawkins, sales manager, Rainway Irrigation Co., discussed the opportunities awaiting the future graduate or established engineer in small business in a talk on "Small Industry Potential" before members of the **Inland Empire Chapter.**

The successful growth and development of a number of small metal industries in Spokane were described and illustrated with slides and charts. Initiative, results and education were given, in that order, as the qualifications most desired of the engineer by small business. The pros and cons of big corporation and small business as to its effect on technical personnel were also discussed.

During the meeting, which was held at the Washington State College Campus at Pullman, Dean John P. Spielman, head of the department of mining and metallurgy, presented the annual A.S.M. student scholarship award of $400 to David P. Roberts, sophomore in metallurgy from Yakima, Wash.--**Reported by G. S. Fergin for Inland Empire.**

Brooklyn Polytech Honors Alumnus

The Polymets, a Group Composed of Metallurgical Alumni of the Polytechnic Institute of Brooklyn, Gathered During the National Metal Congress and Exposition in Philadelphia to Honor Professor Stanislaus Skowronski, Research Engineer, International Smelting & Refining Co. Shown are, from left: Richard Foxon, representing Brooklyn Polytech, and Prof. Skowronski

On Oct. 19, the metallurgical engineering alumni of Polytechnic Institute of Brooklyn gathered at the Benjamin Franklin Hotel in Philadelphia for the purpose of conveying to Prof. Stanislaus Skowronski a token of their appreciation for his kind understanding and guidance over the past 28 years.

The Polymets, as they have nicknamed themselves, organized a committee composed of Messrs. L. Anselmini, G. Fischer, J. E. Krauss, F. Polizzano and M. Yokelson. This committee arranged to hold this luncheon in conjunction with the National Metal Congress and Exposition. It is the intention of the organization to continue as a semi-social group which will probably sponsor similar functions in the near future.

Some 35 former students were in attendance and communications were received from numerous others who could not attend in person. Among those writing or wiring their felicitations was Harry S. Rogers, president of the Institute.

J. Edward Krauss, head, department of mechanical technology, New York City Community College, was the toastmaster and among the guests were Profs. Marian Balicki and Otto Henry of the Polytechnic faculty. The focal point of the celebration was the presentation of honorary membership in the Polytechnic Alumni Association to Dr. Skowronski.

Professor Skowronski, presently research engineer at International Smelting & Refining Co., is a member of the New Jersey Chapter. All of the Polymets, with the exception of Dr. Rogers, are A.S.M. members.

Speaks on Rolling Practices at York

York Chapter Heard a Talk on "Steel Rolling Practice" by H. N. Meyers, Assistant Metallurgical Engineer, Bethlehem Steel Co. Present were, from left: Mr. Meyers, and Roy Livingston, chairman of the York Chapter

Speaker: H. N. Meyers

Bethlehem Steel Co.

The **York Chapter** heard a talk on "Steel Rolling Practice and Its Relation to Surface Defects in Steel" given by H. N. Meyers, assistant metallurgical engineer, Bethlehem Steel Co.

Mr. Meyers' illustrated talk covered the origin of various types of defects and the methods employed by steel producers to avoid and to help correct them.

The influence of steelmaking practices and rolling conditions were reviewed. It was demonstrated that defects could be related to deoxidization and pouring practices, to heating and rolling conditions, as well as to mechanical factors. Some of the practice controls and inspection procedures aimed at minimizing surface defects were also mentioned.

At the conclusion of the meeting, Mr. Meyers led a very interesting question and answer period.—**Reported by J. L. Brown for York.**

Tulsa Holds First Students Night Meeting

Karl Fetters, Youngstown Sheet & Tube Co., and A.S.M. Trustee Spoke on the "Physical Chemistry of Steelmaking" at the First Students Night Meeting of the Tulsa Chapter. The meeting was attended by 75 students, selected by their instructors, from Tulsa University and city high schools. The students were sponsored by members and guests of the Chapter. (Reported by J. C. Holmberg for the Tulsa Chapter)

Points Out Importance of Fatigue Testing at Tri-City Chapter Meeting

Speaker: H. R. Neifert
Timken Roller Bearing Co.

H. R. Neifert, supervisor of railway research, Timken Roller Bearing Co., addressed the **Tri-City Chapter** on the "Relation of Metallurgy to Design" at a recent meeting. Mr. Neifert pointed out that the conclusion to be drawn from his remarks would probably be that there is not much relationship; however, his talk touched on many points of common interest to the fields of metallurgy and design.

Since a large percentage of failures in machine parts occur by fatigue, Mr. Neifert emphasized that aspect of the design problem. He pointed out that it is seldom possible to realize, in the actual service life of a part, the full endurance limit based on standard rotating beam fatigue data. This may be due to many factors, such as surface conditions, stress concentrations arising from shape, residual stresses in the material, and what was referred to as size effect. The effect of size was dramatically demonstrated by the results of fatigue tests on three specimens, differing widely in size, cut from the same bar of low carbon steel. The smallest, or standard rotating beam specimen, showed a fatigue life considerably higher than the largest specimen, a full-sized railroad car axle. The difficulty of computing and applying stress concentration factors for various types of notches and other shapes was also discussed.

The importance of internal stress distribution as a controlling factor in fatigue life was illustrated by work carried on at the speaker's laboratory. Axle shafts of plain carbon steel showed greatly improved life when compressive stresses were induced in the surface layers. One effective means of introducing such stresses was found to be surface rolling. This procedure increased fatigue life by as much as 100%. Another method of producing the desired compressive stresses was to induce thermal stresses by water quenching the part from subcritical temperatures. A number of plots of stress distribution in the cross sections of large shafts were shown, illustrating the correlation of such distribution with the fatigue life of the material.

The importance of fatigue testing full-size components rather than relying on data from small standard samples was strongly emphasized, since in no other way can all the factors contributing to the life of a given component be effectively evaluated. **—Reported by R. H. Sholtz for Tri-City Chapter.**

IMPORTANT MEETINGS
For January

Jan. 18-20—Society of Plastics Engineers, Inc. Twelfth Annual Technical Conference, Hotel Statler, Cleveland, Ohio. (National Office, 34 East Putnam Ave., Greenwich, Conn.)

Jan. 23-26—Plant Maintenance and Engineering Show and Conference, Philadelphia, Pa. (Clapp & Poliak, Inc., 341 Madison Ave., New York 17, N. Y.)

Joins Metal Progress as Chicago District Manager

C. Robert Bilbrey has been appointed district manager in Chicago for *Metal Progress*.

A graduate of Purdue University with a B. S. degree in industrial education, Bob came to the American Society for Metals from the Dor-

Bob Bilbrey

meyer Corp., Chicago, where he was assistant advertising manager of the power tool division. Prior to his association with Dormeyer, he had been with Schwimmer and Scott, Inc., Chicago advertising agency.

With offices at 53 West Jackson Blvd., Bob will cover the midwestern territory, including Illinois, Wisconsin, Minnesota, Western Michigan, Indiana, Iowa, Missouri and Kentucky. He is married and lives in Arlington Heights, a Chicago suburb.

ASM spends $44.50 to service each member of the Society for a period of one year.

High Speed Steels Topic at Syracuse

A Discussion on "High Speed Steels" and a Panel Which Answered Audience Questions on the Same Subject Were Featured at a Meeting Held Recently by Syracuse Chapter. E. A. March, Sanderson-Halcomb Works, Crucible Steel Co., was the principal speaker. Shown are, from left, seated: W. Moulton, C. McShane and R. N. Gillmor, panel members, and Mr. March. Standing, from left: W. Hodapp, moderator, and H. Holbert, chairman

Speaker: E. A. March
Crucible Steel Co.

At a meeting of the **Syracuse Chapter,** E. A. March, chief metallurgist, Sanderson-Halcomb Works, Crucible Steel Co., discussed "High Speed Steel".

The development of toolsteels progressed from the straight carbon types to the modern high speed alloy steels as the specific property requirements were recognized and, through the evolution process, the 18-4-1 alloy grade appeared with its family of analyses.

Heat treating procedures and their effects, surface finish requirements and the appearance of the free-machining grade of toolsteel were also discussed.

The first thought of the design engineer, according to Mr. March, is to use the best high-speed grade toolsteel for his application. Because of this, in many instances, tool costs are higher than they need be, since an equal improvement might have been made through geometry changes.

Following the talk by Mr. March, a panel discussion was held. Included on the panel were W. Moulton, C. McShane, R. N. Gillmor and Mr. March. Panel moderator was W. Hodapp, acting chairman was H. C. Holbert.—**Reported by L. Zakraysek for Syracuse Chapter.**

Ottawa Valley Hears Role of Metallurgist Working in Steel Plants

Speaker: Ralph Hindson
Steel Co. of Canada, Ltd.

"The Role of the Metallurgist in the Steel Plant" was the subject of a talk given by Ralph Hindson, assistant chief metallurgist, Steel Co. of Canada, Ltd., at a meeting of the **Ottawa Valley Chapter.**

A film was shown which described in detail Steel Co. of Canada's operation, from ore to finished product. Mr. Hindson outlined the general setup of the metallurgical department, and particularly described problems encountered at the Hamilton works.

The main functions of the metallurgist were summed up as follows: To control quality and specifications of the product; to set up all plant processes; to work with the engineering department on design and construction of new equipment; to be responsible for customer technical service; to inspect and study all processes. Mr. Hindson stated that, above all, the steel metallurgist must consider yield and cost control, and within the limits of competitive economics, must devise methods for producing the best possible product.

Some of the typical problems discussed related to ingot structure and mold design, the development of an openhearth immersion thermocouple, troubles arising in production of tin plate and enamelling iron, design of railroad spring washers, and the quality and properties of rope wire.

Mr. Hindson outlined the reasons why aluminum-killed steel makes a better deep drawing steel than rimmed steel, in spite of its higher cost. By controlling the acid soluble aluminum content, the cycles of annealing and degree of cold rolling, an elongated grain can be achieved in sheet which results in superior deep drawing characteristics.

Two of the major accomplishments of the research and development group at the company have been the establishment of optimum heating and cooling cycles for rapid production of consistently good quality tinplate and galvanizing stock and positively establishing the minimum safe soaking pit times for ingot heating. —**Reported by D. A. Scott for Ottawa Valley Chapter.**

Rockford Completes Course On Machine Shop Metallurgy

The **Rockford Chapter** has recently completed a five-week course on "Machine Shop Metallurgy". There were 87 registrants in the course, with an average attendance of 76.

The following subjects and speakers comprised the course:

Materials and Machinability, by Lee G. Miller, Greenlee Brothers and Co.; Testing and Trouble Shooting, by George K. McFall, Barber-Colman Co.; a movie, "In the Chips", produced by Chase Brass and Copper Co.; Metallurgy and the Machinability of Metals, by Glenn D. Boyer, LaSalle Steel Co.; Tool Materials and Toolsteels, by Ural H. Gillett, Barber-Colman Co.; Carbides, by Harry I. Ostrum and W. H. Bleeker, Allegheny-Ludlum Steel Corp.; and Metallurgical Aspects of Grinding, by John Truelson, Norton Co.

Certificates were presented to the members of the course who attended all of the lectures.—**Reported by E. C. Wallace for Rockford.**

Describes Systems of Power Generation From Nuclear Fuel

Speaker: Leo Macklin
Combustion Engineering, Inc.

Leo Macklin, nuclear engineer and director of nuclear sales, Combustion Engineering, Inc., speaker at a recent meeting of the **Canton-Massillon Chapter**, presented a talk on "Power Generation From Nuclear Fuel". Mr. Macklin had recently returned from Geneva, Switzerland, where he represented his company at the Geneva Conference on Atomic Energy.

A brief review of nuclear research history and nuclear theory was presented in introduction of the subject. When uranium^{235}, plutonium^{239} or uranium^{233} is bombarded with neutrons, their nuclei are susceptible to splitting or fissioning, with the consequent release of excess neutrons, fission products, radiation and heat. These are controlled and used for power generation.

Since there are not unlimited sources of fossil fuel in the world today, it is imperative that other sources of power be developed.

The object in a reactor is to control the rate of fission of the fuel. Both slow moving and fast moving neutrons are being used in current reactor experiments. Depending on the type of fissionable material used, a slow or fast reactor is most suitable for the generation of power. Uranium^{233}, which emits 2.31 neutrons for each thermal neutron absorbed, is best utilized in a slow or thermal reactor; on the other hand, plutonium^{239}, which emits 2.03 neutrons for each slow neutron absorbed and 2.7 neutrons for each fast neutron absorbed, is most suitable in a fast reactor.

Mr. Macklin discussed the pressurized water reactor system, the boiling water reactor system, the aqueous homogeneous reactor system and sodium cooled reactor system for generating power and mentioned the advantages and disadvantages of each of the systems.

In the pressurized water reactor system, the reactor core is in a reactor vessel. The core contains the fissionable material in a carefully designed lattice arrangement with water serving as a moderator and coolant. A chain reaction is started by control rod withdrawal and heat is generated in the core and transferred to the water in the core. Heat is removed from the water through a steam generator and thence transmitted to a conventional power cycle. The reaction is controlled automatically by the temperature changes in the water, which tends to maintain a constant average temperature throughout the load range. In addition, the neutron absorbing control rods are available to vary the fission rate and heat release. As the core ages, the control rods are gradually pulled out. For the pressurized water reactor being built at Shippingport, Pa., the reactor is approximately 30 ft. high, 9 ft. I.D., with stainless steel clad walls 8½" thick. There is a lifting force on the removable head of 25,000,000 lb.

In the boiling water system, steam is piped directly into the turbine with no heat exchanger being present. This presents serious problems because of the activity of the steam in the turbine cycle. The process also can become unstable if the amount of boiling in the core exceeds certain limits.

In one type of aqueous homogeneous reactor system, uranium sulfate is dissolved in heavy water and circulated through an inner sphere of a double sphere arrangement. Within the sphere a chain reaction occurs and heat is generated. Thorium slurry in suspension in heavy water in the outer core can generate uranium^{233} by neutron absorption and thus "breed" fissionable material. Both the uranium solution and the thorium slurry pass through steam generators, activating the iron as well as depositing fission products on piping and steam generator surfaces, creating a bad condition for maintenance. Heavy water is used because it does not absorb neutrons as readily as water and gives better neutron economy. Homogeneous systems have the advantage of permitting continuous removal of fission products (poisonous to neutron economy) by by-passing a part of the circulating streams through an integral processing plant.

The sodium reactor system uses liquid sodium as the coolant in the core. Two heat exchange steps are considered desirable to prevent active sodium from passing through the steam generator where a sodium-water chemical reaction could conceivably throw the very active sodium into areas external to the circulating loops. High temperature and low pressure coolant conditions, with a steam cycle operating under pressure and temperature conditions closer to modern high-pressure and high-temperature practices are desirable features of this system.

In conclusion, Mr. Macklin said that because of relatively low neutron absorption, four metals, beryllium, magnesium, zirconium and aluminum, are desired for structural materials in slow or thermal reactors. Fast reactors, where the neutrons are not so prone to being "parasitically" absorbed, can use more conventional high-strength materials. Neutrons and heavy fission products cause damage to the core metals by displacing or distorting the atoms of their atomic lattice structure — akin to work hardening. Experimental evidence indicates that a part of this lattice distortion may be annealed out. In the final analysis, core life is a function of radiation damage and the amount of excess fissionable material in the core. **—Reported by Edmund S. Rider for Canton-Massillon Chapter.**

Titanium Panel Featured at San Diego

A Panel Meeting on "Titanium" Was Held by the San Diego Chapter Recently. Pictured are members of the panel, from left: C. B. Voldrich, assistant coordinating director, Battelle Memorial Institute, who explained the activities of the Government titanium program and development center at Battelle; S. R. Carpenter, producibility section, Convair, who discussed the engineering and practical applications of titanium; R. L. Clark, works manager, Ryan Aeronautical Co., panel chairman; John H. Garrett, Department of Defense, who discussed the National position of titanium; and D. L. Day, research metallurgist, Titanium Metals Corp. of America, who presented a progress report on the processing of sponge, and on the rolling and forging of shapes. (Reported by T. E. Piper for San Diego)

Problems in Titanium Use Explained

Present at the First Meeting of the Long Island Chapter This Season Were, From Left: H. S. Kalish, Chairman; J. H. Clough, Technical Chairman; Loren W. Smith, Who Discussed "Problems in Using Titanium"; G. F. Stradar, Arrangement Chairman; and L. F. Welanetz, a Guest of the Chapter

Speaker: Loren W. Smith

Cornell Aeronautical Laboratory

Loren W. Smith, head of the metallurgical section, Cornell Aeronautical Laboratory's materials section, presented a talk on "Problems in Using Titanium" at a meeting held by the **Long Island Chapter.**

Mr. Smith, who has recently completed a survey of the aircraft industry and titanium producers throughout the country, illustrated his talk with statistics and slides.

The making of titanium sponge by the Kroll process to meet defense requirements has been heavily subsidized by the Government. A number of companies have an assured market in the Government stockpile for large production allotments of titanium sponge. This sponge is currently being produced at a much greater rate than can be absorbed by industry due to a serious lag in usage which was not anticipated at the time the program was inaugurated. One recent setback which titanium has suffered has been the trouble incurred from hydrogen embrittlement before it was discovered that hydrogen content would have to be maintained at a level below 150 ppm. Now, with chemical control of sponge and processing quality control, this serious problem has been surmounted.

The commercial alloys of titanium are of the alpha and the alpha and beta types. The latter can be hardened by heat treatment. No completely beta alloys have been developed commercially. The serious difficulty with alloys is the unpredictable behavior from one heat of matrial to the next. Methods are being developed, however, to control the uniformity of alloys. A new alloy worth watching is 6Al-4V, which has high strength at moderately high temperatures and can be welded.

Among present applications of titanium in airframes are firewalls, jet aft section skins and stiffeners around after-burner sections. In jet engine parts encountering service temperatures up to 800°F., titanium alloys are being used to some extent for compressor wheels and blades and other turbine components.

The factor of cost is now the principal obstacle to the expanding use of titanium. With the price of sponge at about $3.80 per lb., it still fails to look attractive to nondefense industries. It is felt that this price will not drop to any great extent for perhaps five more years or until some new and cheaper method can be devised to produce sponge and wrought forms.

The future of titanium seems fairly well assured with the Air Force and the Government solidly behind it. The benefits to be derived through weight saving and high service temperature will in all probability serve its use for defense purposes until such time as the cost of producing sponge can be reduced and its use becomes more general.—**Reported by C. F. Zabriskie for Long Island Chapter.**

Pittsburgh Ladies Tour Continental Can Plant

During the annual Ladies Day meeting of the **Pittsburgh Chapter,** members and their wives visited the Pittsburgh plant of the Continental Can Co. After touring the plant facilities in the afternoon, a dinner gathering was held.

G. E. Lewis, personnel supervisor, and R. G. Schubert, assistant to the personnel supervisor, conducted the tour through the plant, which is principally concerned with the construction of metal containers, paint cans, beverage cans, etc., and cork-lined crowns for containers. The plant, covering 16 acres under one roof, is almost fully automatic, some metal containers being constructed and packaged at a rate of 425 per min. Construction of the containers was observed in the following general sequence of operation: (a) Lithography, the printing of colored diagrams on metal sheet; (b) slitting, or cutting the metal sheet to the desired size; (c) pressing the bottoms and tops; (d) rolling and soldering the body cylinders; (e) assembling the container by rolling the top and bottom to the body cylinder; and (f) packaging into 24 and 48-unit packages.—**Reported by C. W. Spencer for the Pittsburgh Chapter.**

Chicago-Western Group

A Western Group of members of the American Society for Metals, presently assigned to the Chicago Chapter, is in the process of being organized. This Western Group is being formed for the benefit of members who live in the Western Chicago suburbs, Joliet, the Fox River Valley, etc.

C. E. Swartz, consulting metallurgist, has been elected chairman of the Group.

Technical Papers Invited for A.S.M. Transactions

The Publications Committee of the A.S.M. will now receive technical papers for consideration for publication in the 1957 *Transactions* and possible presentation before a national meeting of the Society. A cordial invitation is extended to all members and nonmembers of the A.S.M. to submit technical papers to the Society.

Many of the papers approved by the Committee will be scheduled for presentation on the technical program of the 38th National Metal Congress and Exposition to be held in Cleveland Oct. 8-12, 1956. All papers that are accepted will be preprinted. Manuscripts should be received at A.S.M. headquarters office not later than April 2, 1956.

Acceptance of a paper for publication does not necessarily infer that it will be presented at the annual convention. The selection of approved papers for the convention program will be made early in June.

Manuscripts in triplicate, plus one set of unmounted photographs and original tracings, should be sent to the attention of Ray T. Bayless, assistant secretary, American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

Should it be your intention to submit a paper, please notify A.S.M. A copy of the booklet entitled "Suggestions to Authors in the Preparation of Technical Papers" will be gladly forwarded. This booklet may help considerably in the preparation of line drawings and illustrations.

Metallurgical News and Developments

Devoted to News in the Metals Field of Special Interest to Students and Others

A Department of *Metals Review*, published by the
American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio

Blind Testing—With an ultra-sensitive electronic sound gage developed by Burroughs Corp., it is expected that blind people will be able to do precision testing of close tolerance parts. The gage is connected by cable to an amplifier and measures accurately to 0.0002 in. Thickness readings are taken electronically and transformed into sound tones as well as visual light signals for users with normal vision.

Heliports — Dravo Corp. will manufacture landing areas for helicopters consisting of structurally supported sections of open steel grating forming a landing strip which will support 10,000 lb. per helicopter wheel.

Sun - Powered Auto — Automobile Manufacturers Assoc. has developed a model auto to show the possible uses of sun as a direct power source. The 15-in. car has 12 photo-electric selenium cells on its top which convert light into electric power to operate a tiny motor propelling the vehicle.

India Steel—Tata Iron & Steel Co., India, has signed a contract with Henry J. Kaiser Co.'s engineers division to handle a $130-million expansion for its Jamshedpur works. Kaiser will design and construct facilities to boost Tata's production.

Men Wanted—We may run out of trained manpower and brainpower sooner than we run out of oil or iron ore reserves, according to L. W. Houston, president, Rensselaer Polytechnic Institute. Industry used one engineer for each 400 employees 75 years ago. Today the demand is one engineer for each 40 employees.

New College—A college of liberal arts emphasizing basic science and engineering, and bearing the name of the late Harvey S. Mudd, Los Angeles mining engineer and civic leader, will be established at Claremont, Calif., in response to the anticipated doubling of the college population in Southern California in the next 12 years.

Tungsten in Alloys—An all-out effort by the domestic tungsten mining industry to develop the full usefulness of tungsten in high-temperature alloys has been announced by the Tungsten Institute. Plans for the research program were announced with the signing of a contract by the Institute with Stanford Research Institute, where the work will be carried on.

Lab Increase—Use of scientific laboratories for research, quality and cost control and new product development, has increased more than 15% in the nonferrous metalworking industries during the past five years, according to a report made by Chicago Apparatus Co.

TV X-Ray—A new method of X-raying industrial products, involving the use of television, utilizes an improved photoconductive X-ray pick-up tube, and can be used to expedite quality control. The method, described at the Winter Meeting of the A.I.E.E., was developed by G. E. engineers.

Jet Corrosion—Corrosion in jet engines, which can develop overnight between flights, can be combatted with a new process developed by Arthur D. Little, Inc. The process seals corrosion-inhibiting gases into the plane's engines upon return from flight.

Seven Wonders—The seven wonders of the engineering world, as reported by the American Society of Civil Engineers in *Time* (Oct. 31, 1955) include: Grand Coulee Dam, Hoover Dam, San Francisco-Oakland Bridge, Colorado Aqueduct, Empire State Building, Panama Canal, and the sewage system in Chicago.

Short Runways—NACA is testing a new type built-in jet aircraft brake, known as a thrust reverser, with a view to decreasing the length of runways by one-third.

Aluminum Chain—McKay Co. is producing a welded aluminum chain said to have a working load limit only 60% that of a steel chain of the same size but 65% lighter in weight. The chain combines lightness with nonmagnetic and corrosion resisting properties.

Milling Machine—U. S. Burke Machine Tool Division is building a milling machine in which the horizontal spindle rotates for angle milling. The swiveling spindle provides extreme rigidity for precision work.

Award—Metal Powder Association has announced availability of a $500 scholarship in powder metallurgy for this coming year. Write to M.P.A., 420 Lexington Ave., New York 17, for further information.

Spectrometer—An X-ray spectrometer, so sensitive it can detect changes as small as a billionth of an inch in the distance between crystal facets, has been designed by G.E.'s Atomic Energy Commission Hanford plutonium plant. The spectrometer is used to measure submicroscopic damage suffered by solids exposed to chain reaction heat and radiation in an atomic pile.

Disston Sells—Henry Disston & Sons, Inc., has approved sale of the tool and saw making company to H. K. Porter, Inc.

To Build—A projected 1-million ton expansion, which will cost National Steel Corp. $200-million, should be completed in 1959. Chrysler Corp. will spend $1-billion plus in the next five years on plant and equipment.

Tin Stockpile—*Tin News* reports that by the end of 1956 fiscal year the tin stockpile will contain or have available sufficient tin metal to meet the long-term objective, enough to meet any foreseeable defense emergency.

Vacuum Furnace Pact—National Research Corp. has signed an agreement with Deutsche Gold- und Silber-Scheideanstalt A.G., Frankfurt, for an exchange of information relating to high-vacuum furnaces.

Foundry Volume—Wisconsin's extensive foundry industry is pouring castings at a record peacetime volume in an effort to meet industrial demands for metal parts. All segments of the industry have experienced the swelling of new orders during 1955 as America's production has risen to record proportions. Some foundries report orders are 40% above this same time a year ago.

Conference—Resistance welding and design for welding will be stressed Feb. 1 and 2 at the second Midwest Welding Conference at Armour Research Foundation of Illinois Institute of Technology.

CHAPTER MEETING CALENDAR

CHAPTER	DATE	PLACE	SPEAKER	SUBJECT
Baltimore	Jan. 16	Engineers Club	Peter Payson	Tool and Die Steels
Calumet	Jan. 10	Phil Smidt's	Walter Crafts	Effects of Deoxidizers on Nitrogen in Steel
Canton-Massillon	Jan. 17	Mergus Restaurant	Social	Ladies Night
Carolinas	Jan. 19	Salisbury, N. C. Elks Club	James McElgin	Metal Coating Process
Chattanooga	Jan.	Maypole Restaurant	D. J. McPherson	
Chicago-Western	Jan. 16	Furniture Mart	Stephen James	Sejournet Extrusion Process for Steel
Cleveland	Jan. 9	Hotel Hollenden	H. J. Rand	What's Ahead
Columbia Basin	Jan. 19		J. H. Hollomon	Physical Metallurgy
Columbus	Jan. 4		Frank Vandenburg	Embrittlement of Titanium Alloys
Dayton	Jan. 11	Engineers Club	G. H. Enzian	Free Machining Steels and Machinability From a Metallurgical Perspective
Detroit	Jan. 9	Engineering Society	W. Manley	Metallurgy for Nuclear Reactors
Eastern New York	Jan. 10	Panetta's	Panel	Brittle Fracture
Fort Wayne	Jan. 10	Hobby House Ranch	Jerome Strauss	Micrometallurgy
Hartford	Jan. 10	Indian Hill Country Club	I. E. Campbell	Protective Coatings for Metals
Indianapolis	Jan. 16	Village Inn	A. G. Cook	Extrusion of Stainless Steel
Los Angeles	Jan. 26	Rodger Young Auditorium	M. E. Carruthers	Precipitation Hardening Stainless Steels
Mahoning Valley	Jan. 10	Post Room, V.F.W.	D. W. Murphy	Openhearth Night
Milwaukee	Jan. 17	City Club	K. F. Schauwacker	Practical Aspects of Quenching
Montreal	Jan. 10	Queen's Hotel	K. R. Knoblauch	Practical Aspects of Pyrometry in the Metal Processing Industries
Muncie	Jan. 10	Muncie	G. A. Fisher, Jr.	Ductile Cast Iron
New Jersey	Jan. 16	Essex House	Panel	Modern Commercial Heat Treatment
New York	Jan. 9	Hotel Victoria	Panel	Toolsteels
Notre Dame	Jan. 1		W. J. Barnett	Hydrogen Embrittlement and Delayed Fracture
Oak Ridge	Jan. 18	K of C Hall	T. W. Lippert	Fabrication and Applications of Titanium
Ontario	Jan. 6	Royal Connaught	F. B. Foley	Failure of Metals at Elevated Temperatures
Oregon	Jan. 26	Congress Hotel		Powder Metallurgy
Ottawa Valley	Jan. 10	P.M.R.L.	R. Potvin and L. Gravel	Metallurgy and Chemistry in Scientific Investigation and Crime Detection
Philadelphia	Jan. 27		H. J. Babcock	Cold Extrusions
Juniors	Jan. 9	Engineers Club	W. W. Wentz	Physical Metallurgy and Metallography of Titanium
Phoenix	Jan. 20		DoAll Co.	Civilization Through Tools
Pittsburgh	Jan. 12	Gateway Plaza		
Puget Sound	Jan. 27	Engineers Club	H. M. Hausner	Latest Developments in Powder Metallurgy
Purdue	Jan. 17	Memorial Union		Management
Quebec	Jan. 17	Laval University	J. F. Libsch	Metallurgical Aspects of High-Frequency Induction Heating
Rhode Island	Jan. 4	Johnson's Hummock Grill	Q. Mehrkam and O. D. Oksanen	Electric Furnace and Salt Brazing
Rockford	Jan. 25	Faust Hotel	J. F. Tyrrell	Progress in Metals and Metals Engineering
Rocky Mt.-Denver	Jan. 20	Oxford Hotel		Nucleonic Engineering
Saginaw Valley	Jan. 17	Fischer's	F. G. Tatnall	What Are Metallurgy and Engineering Doing to Us
Southern Tier	Jan. 16	Elmira, N. Y.	David Swan	Metallurgy of Welding and New Processes
Texas	Jan. 3	Ben Milam	Marvin Scott	Flame Hardening
Tri-City	Jan. 10	Rock Island Arsenal	T. E. Eagan	Nodular Iron
Tulsa	Jan. 9	Alvin Plaza Hotel	M. L. Powers	Flame Plating
Washington	Jan. 9		T. C. DuMond	What's New in Engineering Materials
West Michigan	Jan. 16	Lock's Restaurant	A. G. Gray	What Automation Means to Metallurgy
Western Ontario	Jan. 13	London		Mineral Resources in Prospect
York	Jan. 11	York		National Officers Night

Meet Your Chapter Chairman

E. E. Grider

W. R. Hibbard, Jr.

G. Letendre

EASTERN NEW YORK

WALTER R. HIBBARD, JR., a native of Bridgeport, Conn., received an A.B. degree in physical chemistry from Wesleyan University in 1939 and a D.Eng. degree in physical metallurgy from Yale in 1942. He played football and ran track while at college.

Walt spent several years in teaching and research before joining General Electric's Research Laboratory, where he is now manager, alloy studies research, metallurgy and ceramics research department. He is married and father of three children.

Walt's service record covers a period from 1942 to 1945, during which time he rose from ensign to lieutenant commander in the U.S.N.R., serving in the metallurgical section of the Bureau of Ships. He likes golf, tennis and painting.

QUEBEC

GERARD LETENDRE, director, department of mining and metallurgy, Laval University, and senior partner, Letendre, Monti & Associates, consulting engineers, was born at St. Germain, P.Q. He holds degrees from University of Montreal, McGill University, the Imperial College of Science and Technology, and the University of London. He has previously worked as assistant foundry metallurgist and in a research laboratory.

Mr. Letendre is married and has two children. He is a member of many technical and service organizations, both in North America and in England, and is on the materials research panel of the Canadian Department of National Defense. His favorite pastimes are tennis, hockey and curling.

ROME

ERNEST E. GRIDER, division metallurgist, Utica Drop Forge & Tool Corp., Precision Forge Division, is a native of Columbus, Ind., and a graduate of Purdue University, where he participated in basketball and baseball activities. His first job out of school was as a metallurgical observer in a steel mill and he has worked as a supervisor of physical testing, laboratory supervisor and specifications engineer prior to his present position.

Mr. Grider, who was a radio repairman in the Army Signal Corps, is interested in golfing and bowling.

CHICAGO

CARL H. SAMANS was born in Greenville, Pa., and received most of his schooling in Philadelphia. He graduated from Rensselaer Polytechnic Institute with the degree of chemical engineer in 1929 and went to work in the research laboratory at Chase Brass & Copper Co. During the ensuing five years, while still with Chase, he earned both the M.S. and Ph.D. degrees in metallurgy at Yale University. The next eight years he taught metallurgy at Lehigh, Rensselaer, and Penn State. From 1941 to 1949 he was in the research department of American Optical Co., except for a period during the war when he was with the Conservation Division, War Production Board. Early in 1949 he accepted his present position as associate director of the engineering research department, Standard Oil Co. (Indiana).

Carl is married and has three children. He belongs to several technical societies and has served on the executive committee of the Metals Division, A.I.M.E. and was chairman of the Mathewson Gold Medal Award Committee. He has served on the A.S.M. publications committee and has several articles in Metals Handbook. He is also the author of the textbook, "Engineering Metals and Their Alloys". He has been active in local civic organizations and has served as president of the Beverly Home Owners Association and of the Whiting Science Club. He is a member of the troop committee and a merit badge counselor with the Boy Scouts.

At present his chief hobbies are bridge and sailing. He is a member of both the United States Power Squadron and the Jackson Park Yacht Club. Golf and bowling receive some attention but his skills are chiefly shown by his frequent holding of the Duffer's cups in both sports.

MONTREAL

JASON J. WALLER, chief materials and process engineer, Canadair Ltd., was born and received his education in Montreal. He is a graduate of McGill University, where, as a student, he was active in tennis and skiing. His first job was as a stress engineer with Noorduyn Aviation Ltd., and he worked as assistant chief engineer at Fairchild Aircraft Ltd. before joining Canadair.

Jason is married, has no children. He is a member of several technical and service organizations and has served on the editorial committee for the *Journal* of the Canadian Aeronautical Institute. He was chairman of the Montreal Chapter A.S.M. educational committee for three years and chairman of the meetings and papers committee for one year. His hobbies include fishing, music, theater, tennis and photography.

LOUISVILLE

CARL L. OWEN, JR., was born in Leeds, Ala., and attended grade and high schools there. He graduated in 1941 from the University of Alabama with a B.S. degree in chemistry, metallurgy and ceramics. After graduation he worked as a metallurgist with the Tennessee Coal, Iron and Railroad Co. until 1943, when he became a metallurgist for Reynolds Metals Co. Since 1947 he has been a metallurgist at International Harvester's tractor plant in Louisville.

Carl is married and has one child. He has been active in the Louisville Chapter for several years, having served for three years as secretary-treasurer before becoming vice-chairman and chairman.

Carl, who was active in sports in high school and college, continues to be interested in football, baseball, golf and fishing.

Carl L. Owen, Jr.

C. H. Samans

J. J. Waller

Panel Debates Use Of Weldments and Castings at Meeting

A panel discussion on "Castings Versus Weldments" was recently presented by the **Minnesota Chapter.** Members of the panel were Fred Quest, president, J. F. Quest Foundry Co.; Warren Logemann, production manager, Brown Steel Tank Co.; John Uppgren, foundry manager, Northern Ordnance Inc.; and Norman Qualey, test engineer, Northern Ordnance Inc.

Fred Quest, who also acted as moderator, described the similarities and difficulties of the metallurgical processes involved in making castings and weldments. He discussed fundamental design characteristics and pointed out that structural members, such as tanks, are readily made as weldments, while valve blocks and heads are readily made as castings.

Mr. Quest stated that there are overlapping areas, such as quantity consideration, alloy characteristics, or costs, which determine whether or not the part should be a weldment or a casting. There are many composites made which consist of castings and weldments welded together to produce a finished piece. Appearance, total weight and physical properties influence the designer's choice of material.

Pilot models are often made as weldments to eliminate the cost of patterns but the production run may revert to castings.

Warren Logemann discussed cost analysis and basis factors involved in deciding which method to use. Size, such as section thickness and total weight, often determines the method used. Total quantity to be made also plays an important part on the over-all cost of the product. Weldments are often used for short runs because of the low initial pattern cost. He also discussed design factors which eliminate machining. Appearance is one of the main factors in cost analysis.

John Uppgren discussed metallurgical and design considerations and pointed out that it is necessary for a designer to have a basic understanding of the metallurgical principles involved in making castings or weldments. There is a marked similarity in the processes and such things as liquid, liquid-solid, and solid phase concepts should be considered. He discussed the problems involved in the thermal coefficient of expansion for castings and weldments, and the effect of liquid, liquid-solid and solid shrinkage. He mentioned high-temperature properties and the part that cooling velocity plays on the physical properties of the castings or weldments. Design considerations, such as material choice, function of the part, appearance, cost, accessibility and dimensional reproducibility are important in the correct selection of the method. Quality control is very important in either production method.

Norman Qualey discussed recent trends in the casting and welding industry. He cited advantages and disadvantages of shell molding, pressure molding, automation and centrifugal castings. He pointed out that investment, plaster, dye and permanent mold castings produce good dimensions and finish, and vacuum melting has been used in the production of high-quality melts. The development of castable super-alloys has played an important role in the foundry industry. Better sand bonding agents and inspection methods have improved quality at lower costs.

The T.I.G. process has been developed for welding of hard-to-weld materials. However, it is expensive because of the use of argon or helium gas. The M.I.G. process has been used for both semi-automatic and automatic welding. It produces a rapid weld deposit with minimum cleanup. If argon or helium gas is used as a cover, the process becomes quite expensive. If CO_2 gas can be used, cost is cut accordingly.

He discussed the advantages of automatic and semi-automatic submerged arc welding. Arc air gouging is used because of the much greater speed with lower cost and lower noise level. Furnace brazing, resistance welding and flash butt welding were also discussed.—**Reported by H. Davis for Minnesota.**

Receives Science Achievement Award

W. J. Fretague, Metallurgy Division, Oak Ridge National Laboratory and Chairman, Oak Ridge Chapter, Presented Edward Rutter, Student at Central High School, Fountain City, Tenn., With a Future Scientists of America Science Achievement Award, Consisting of a Check for $100. Pictured are, from left: G. E. Elder, Oak Ridge student affairs chairman; E. E. Stansbury, past-chairman; H. G. Loy, Central High principal; Mrs. Lillian Schieb; Edward; and Mr. Fretague. The award is sponsored by A. S. M.

Edward Rutter, a student at Central High School, Fountain City, Tenn., was honored at a special student assembly when he was presented with a Future Scientists of America Achievement Award by W. J. Fretague, metallurgy division, Oak Ridge National Laboratory and chairman of the **Oak Ridge Chapter.** The award consisted of a check for $100, an award certificate and a FSAF Achievement Award plaque for display at the school. The Science Achievement Awards are sponsored by A.S.M.

Four members of the Oak Ridge Chapter participated in the program. W. J. Fretague; D. A. Douglas, vice-chairman; G. E. Elder, student affairs chairman; and E. E. Stansbury, past chairman and professor of metallurgy, University of Tennessee.

Mrs. Lillian Schieb, science teacher at the school and Edward's teacher-sponsor in the contest, explained to the student body the particulars of the competition and the opportunities that students have to participate in the Future Scientists of America Foundation contest.

G. E. Elder gave the principal address to the assembly. He emphasized the need for scientists and engineers in our highly technical civilization and pointed out the unique rewards that are attendant to the pursuit of a scientific career. He emphasized the importance of a good foundation in the basic sciences to the successful attainment of a degree in the sciences or in engineering.

E. E. Stansbury invited the students to visit the University of Tennessee for counsel and guidance in their problems for the Future Scientists of America Foundation contest.

At a similar assembly at Carter High School, Strawberry Plains, Tenn., O. T. Smith, Jr., was presented with a Science Achievement Award. J. L. Scott, instructor in metallurgy, University of Tennessee and consultant, metallurgy division, Oak Ridge National Laboratory, participated in this program. —**Reported by H. Inouye for Oak Ridge Chapter.**

Explains Flash Welding at New Haven

At a Meeting Held by New Haven Chapter, C. Dana Moore, Manager, Research Laboratory, Thomson Electric Welder Co., Spoke on "Principles of Electric Resistance Flash Welding". Shown are, from left: Delmar E. Trout, technical chairman; Mr. Moore; and M. J. Weldon, chapter chairman

Speaker: C. Dana Moore

Thomson Electric Welder Co.

C. Dana Moore, manager, research laboratory, Thomson Electric Welder Co., spoke on the "Principles of Electric Resistance Flash Welding" at a meeting of the **New Haven Chapter** held recently.

Mr. Moore presented the background and history of electric resistance flash welding, covering a period from the early development of resistance butt welding in 1886 up to the early applications of the flash welding process in the 1920's. Slides showing some of the early types of butt welders and their methods of operation were used to illustrate this history.

Mr. Moore then discussed the principles involved in the flash welding process and gave a brief outline of its advantages over the earlier slow butt welding process, which it has, for the most part, replaced. The principles of the welding cycles were explained and an outline of how they were obtained on various types of equipment was given. The different types of flash welding equipment and a chronological outline of the development of this equipment were also presented.

The balance of Mr. Moore's talk was devoted to explanation and examples of more modern developments in the flash welding field, including the development of pinch-off dies on the flash welding of aluminum and the automatic removal of the flash. The welding of dissimilar materials, such as copper to aluminum, was explained, and practical production uses of the process pointed out.

Mr. Moore then presented a brief discussion of flash welding of titanium and titanium alloys, stainless steel and stainless alloys, flash welding of copper to copper, particularly in extended sections, together with advances in the flash welding of magnesium and magnesium alloys.

The general operation of a recent production installation for flash welding and fully automatic heat treating of welds in type M2 high speed steel was explained.

Mr. Moore mentioned developments in the flash welding of copper-base alloys, such as brass and bronze, with specific attention to the flash welding of leaded brass, and briefly discussed automatic heat treating processes which have been worked out on the flash welding of leaded brass rod for wire drawing.—**Reported by Kenneth L. Tingley for New Haven.**

Welding Methods Described At West Michigan Meeting

Speaker: R. E. Kemp

American Seating Co.

At a meeting of the **West Michigan Chapter**, R. E. Kemp, welding and metals engineer, American Seating Co., presented a discussion on "Metallurgical Aspects of Welding".

Various welding operations now in common use can be adequately controlled with the aid of the many instruments and gages now on the market. This equipment is of little use, however, until a thorough metallurgical analysis of each welding operation has been made. The control instruments serve as a means of keeping all important variables under control after the engineer and metallurgist have determined the merits of welds made under various conditions and from this information have set up welding standards.

Slides in color and in black and white showed the various weld microstructures, desirable and undesirable, obtained from the various welding operations.

Mr. Kemp pointed out the many advantages of a good control plan for welding. Better quality and higher production rates coupled with lower costs were the primary benefits mentioned by the speaker.—**Reported by R. F. Haskins for West Michigan Chapter.**

Student Receives Award at Saginaw

Recipient of an A.S.M. Scholarship Award, Richard Weadock, Is Shown Being Congratulated by T. E. Leontis, Chairman of Saginew Valley Chapter

When, Where and How To Use Hot and Cold Rolled Sheets Explained

Speaker: John S. Alter
U. S. Steel Corp.

Members of the **Mahoning Valley Chapter** heard John S. Alter, assistant metallurgical engineer, sheet and strip products, U. S. Steel Corp., speak on "Processing, Purpose and Characteristics of Hot Rolled and Cold Rolled Sheets".

Mr. Alter's talk centered on the problem of furnishing sheets of proper grade and processing treatment that are most economical for the individual end use. A knowledge of the forming involved, movement of stock, inventory plan, processing equipment and die practice is necessary.

Hot rolled sheets are commonly used for unexposed parts where surface is not important. The quality of sheet specified depends on the dimensional tolerances and surface condition required, along with the forming involved. Special surface and above standard tolerances are available with appropriate extra charges. The metallurgical properties are controlled through the proper steel application, finishing and coiling temperatures by the hot strip mill, or by subsequent heat treatment, if necessary, and are best indicated by grain size, tensile properties and Rockwell hardness.

Cold rolled sheets are suitable for exposed parts requiring a good surface and again the quality of sheet is controlled by the tolerances and surface condition required, along with the forming involved.

Where freedom from stretcher strains is required, the temper rolled sheet should be used as soon as possible. Stretcher strains are connected with the discontinuous yield point of low carbon steels. This yield point, and hence the susceptibility to form stretcher strains, can be removed by cold working the sheet prior to drawing. However, the yield point will return on storage at room temperatures. Temper rolling involves a reduction or extension of 1 to 2%, or if temper rolling is reduced to ¼ to ½% and the yield point elongation is not too large, roller leveling is effective. Where movement of stock is slow, it may be necessary to purchase drawing quality special killed grade. If steel is killed with aluminum, and the sheet has the typical elongated grain, strain aging does not occur once the initial yield point is removed and it does not return on storage at room temperature. — **Reported by A. J. Fletcher for Mahoning Valley Chapter.**

ASM is the largest publisher of books for the metals industry in the world.

Surveys Pure Metal Refining Processes

Bruce Gonser, Technical Director, Battelle Memorial Institute, Spoke on "Production and Refining Techniques for Pure Metals" at a Meeting of the Eastern New York Chapter. With Dr. Gonser (center) are W. R. Hibbard, Jr., (left) Chapter chairman, and J. H. Westbrook (right), executive committee

Speaker: Bruce Gonser
Battelle Memorial Institute

A review of "Production and Refining Techniques for Pure Metals", both common and lesser known varieties, was presented to the **Eastern New York Chapter** by Bruce Gonser, technical director, Battelle Memorial Institute.

Dr. Gonser began by stressing the great need for both the ultrapure and the relatively rare metals for modern applications, especially in the nuclear engineering field. Future development of satisfactory alloys for special jobs also requires a more fundamental knowledge of the common metals we use today. Investigations on pure forms of these metals, such as property determinations and alloying influence, are a logical approach to securing such knowledge.

A few metals are presently available in ton quantities, pure to 99.99%, but most others must be painstakingly prepared in the laboratory through a tedious series of steps, including careful purification of the raw materials, choice of proper reduction technique, and then further purification of the final product.

Many of these purification procedures were described and illustrated with slides, especially the Battelle techniques for purifying iron, the National Bureau of Standards procedures and the iodide process for zirconium, chromium, titanium and vanadium.

Some other techniques mentioned were vapor deposition, halide processes and hearth-type arc melting, today's most useful tool for quick laboratory surveys. To compound the problem of securing these pure metals, there arises the necessity of having analysis procedures sensitive enough to detect the very small amounts of impurities present. This field too needs a much more intensive development.

At the conclusion of his lecture, Dr. Gonser reiterated that the present scale of much of this development is not high, but looking toward the future, it will be a broad field for production and research, requiring the efforts of many highly specialized investigators.—**Reported by N. E. Doyle, Jr., for Eastern New York.**

Openhearth Performance Factors Are Discussed at Northern Ontario Meeting

Speaker: D. J. Carney
U. S. Steel Corp.

D. J. Carney, superintendent of electric furnace department, South Works, U. S. Steel Corp., discussed "Some Factors Affecting Openhearth Performance" in a talk before the **Northern Ontario Chapter.**

Specifically, Dr. Carney enlarged upon the effects of combustion and regeneration practice on openhearth performance, based on extensive temperature surveys made at the South Works.

The accumulated data indicated the following significant relationships:

Openhearth heat time varied inversely with combustion air temperature, a 40 to 60 min. reduction in heat time resulting from a 100° F. increase in air temperature; peak furnace performance was reached after approximately 50 heats following a complete reline. Subsequent performance declined more rapidly in the all-basic furnace than for the silica furnaces; an increase in uptake fantail surface-to-volume ratio caused an increased heat recovery in this zone; both increased furnace pressures and higher firing rates result generally in shorter heat times; and combustion air temperature was observed to vary directly with fuel to air ratio. Deviation from normal combustion air temperature extended the heat time.—**Reported by J. L. Venier for Northern Ontario.**

A.S.M. Review of Current Metal Literature

An Annotated Survey of Engineering, Scientific and Industrial Journals and Books Here and Abroad Received During the Past Month

Prepared by the Technical Information Division of Battelle Memorial Institute, Columbus, Ohio

A General Metallurgical

173-A. Handling of Plutonium in Laboratories: Precautions. H. J. Dunster and E. J. Bennellick. *Atomics (British)*, v. 6, no. 10, Oct. 1955, p. 312-320.

Covers standard laboratory facilities required, use of glove boxes, monitoring air and urine, emergency procedures for up to 10 curies. Table, diagrams, photographs. 9 ref. (A7, Pl)

174-A. Fabricating Copper Alloys. W. E. Alkins. *Metal Industry*, v. 87, Sept. 30, 1955, p. 285-288.

Casting shops, extrusion and tube mills, at research department of Thomas Bolton & Sons, Ltd. Photographs. (A5, F general, Cu)

175-A. One Hundred Years of Metallurgy at Yale. *Metal Progress*, v. 68, Oct. 1955, p. 105-108.

Historical review of educational facilities and personnel. (A2, A3)

176-A. Monel, 1905 to 1955. W. A. Mudge. *Metal Progress*, v. 68, Oct. 1955, p. 132-135.

Historical review of developments in corrosion resistance, age hardening, applications. Table, photograph. 17 ref. (A2, R general, N7, T general, Ni)

177-A. A Dictionary of Metallurgy. A. D. Merriman and J. S. Bowden. *Metal Treatment and Drop Forging*, v. 22, Sept. 1955, p. 395-402.

From "redox indicators" to "recovery mill". Tables, graphs, diagrams. (A10)

178-A. Arc Welding Electrode Buyers Guide. *Steel*, v. 137, Oct. 10, 1955, p. 142-145.

Tradename designations of electrodes for stainless, mild and alloy steels, aluminum and copper, as standardized by ASTM-AWS specifications. Tables. (A10, S22, K1, SS, Al, Cu, AY, CN)

179-A. Welding in Ancient Times. Herbert Maryon. *Welding and Metal Fabrication*, v. 23, Oct. 1955, p. 383-389.

Ferrous and nonferrous welds in archeological specimens. Photographs, diagrams. (A2, K general)

180-A. (German.) **Status of Vacuum Technology.** R. Jaeckel. *Berg- und hüttenmännische Montshefte der montanistischen Hochschule in Leoben*, v. 100, nos. 7-8, July-Aug. 1955, p. 193-201.

Evolution of industrial vacuum techniques from World War II up to present time. Tables, photograph, graphs, diagrams. (A general, C25, D8)

181-A. (German.) **Technical Problems in Vacuum Metallurgy.** K. Diels. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben*, v. 100, nos. 7-8, July-Aug. 1955, p. 201-207.

Problems related to vacuum application in annealing, gas evacuation, sintering, smelting and alloying, sublimation, distillation and evaporation depositing. Photographs, graphs. 4 ref. (A general, C25, J23, H15, L25)

182-A. Automation in the Steel Industry. W. K. Scott. *Western Machinery and Steel World*, v. 46, Oct. 1955, p. 94-99.

Used in hot strip mill, continuous pickler, five-stand tandem mill, continuous annealer, tandem temper mill, flying shear and tinplating. Photographs, diagrams. (A5, F23, ST)

The coding symbols at the end of the abstracts refer to the ASM-SLA Metallurgical Literature Classification. For details write to the American Society for Metals, 7301 Euclid Ave., Cleveland 3, Ohio.

183-A. Prospects for Adequate Supply of Special High Grade Zinc for Die Casting in 1956 Excellent. Charles R. Ince. *Metals (Daily Metal Reporter Monthly Supplement)*, v. 26, Oct. 1955, p. 9-11.

Market discussion of supply-demand, price fluctuation, production and use by other countries. (A4, E13, Zn)

184-A. Manganese From Steel-Plant Slags by a Lime-Clinkering and Corbonate-Leaching Process. II. Pilot-Plant Development. R. August Heindl, J. A. Ruppert, M. L. Skow and J. E. Conley. *U. S. Bureau of Mines, Report of Investigations* 5142, Sept. 1955, 80 p.

Process tested on pilot-plant scale was proved to be technically feasible. Flowsheets, tables, photographs, graphs, diagrams. 7 ref. (A8, B21, ST, Mn)

185-A. Steel's Dynamic Progress. Max D. Howell. *Year Book* of American Iron and Steel Institute, p. 67-77.

Reviews problems solved and those still to be answered in the steel industry over the year 1954-1955. (A4, ST)

186-A. (English.) **Removal of Hydrogen Sulphide From Industrial Gases by Means of Purifying Mass Containing Iron Hydroxide. II.** S. Vajna. *Acta Chimica Academiae Scientiarum Hungaricae*, v. 6, nos. 1-2, 1955, p. 45-76.

Proves that concentrations present in the stationary state depend mainly on the constant of the reaction velocity of oxygen. Graphs, diagram, tables. 11 ref. (A7)

187-A. (Book.) **Handbook of Engineering Materials.** Douglas F. Miner and John B. Seastone, editors. Wiley Engineering Handbook Series. 1391 p. 1955. John Wiley & Sons, New York, N. Y. $17.50.

General information on materials, metals, nonmetals, and construction materials; considers properties, adaptability, availability, and cost of each. (A general)

B Raw Materials and Ore Preparation

186-B. Agglomerating Fine Sized Ores With Low Temperature Coke. C. E. Lesher. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Oct. 1955, p. 1114-1118.

Orcarb process agglomerates with very little carbon; ore-carbon pellets process, using coke as binder. Tables, graphs, photographs. (B14, Fe)

187-B. How a Pilot Plant Helps in Manganese Ore Processing Control. F. A. Fischer. *Industrial and Engineering Chemistry*, v. 47, Oct. 1955, p. 2073-2074.

Equipment and operation of pilot plant to provide testing conditions as close as possible to those existing in a 1200 tons per day mill. Flowsheets. 4 ref. (B14, Mn)

188-B. Preparation of High Purity $ZrCl_4$ From Alkali Chlorozirconates. Robert V. Horrigan. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Oct. 1955, p. 1118-1120.

Prepared by thermal decomposition of fused salts at 500 to 600° C. and at atmospheric pressure and used to introduce zirconium into magnesium alloys. Phase diagrams, tables. (B22, Zr, Mg)

189-B. The Measurement of Thermal Conductivity of Refractory Materials. W. D. Kingery and F. H. Norton. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission)*, NYO-6450, July 1955, 16 p.

Data reported over range from room temperature to 1000° C. for compositions in magnesia-silica system, for gadolinia-samaria solid solutions and for single crystals of rutile. Diagrams, graphs. (B19, P11, Ti, Sm, Gd, Si, Mg)

190-B. Uranium Mining on the Colorado Plateau. W. L. Dare, R. A. Lindblom and J. H. Soulé. *U. S. Bureau of Mines, Information Circular* 7726, Sept. 1955, 60 p.

Problems in mining ore bodies and in selection of development and mining methods. Map, graphs, photographs. (B12, U)

191-B. (Hungarian.) **Nomograms for the Determination of the Specific Gravity of Aluminate Liquors.** Béla Fogarasi. *Kohaszati lapok,* v. 10, no. 9, Sept. 1955, p. 419-423.

Construction of two nomograms for graphic determination of the specific gravity of pure liquors when the composition of the solution is known. Graphs, table, nomograms. (B14, P10, Al)

192-B. (Hungarian.) **New Data on Ore Preparation in Silicon-Thermal Magnesium Metallurgy.** Andor Szulyovszky and Karoly Czako. *Kothoszati lapok,* v. 10, no. 9, Sept. 1955, p. 413-419.

Crushing and calcining of dolomite, equipment, briquetting. Tables, graphs. 12 ref. (B13, B14, B15, B17, Mg, Si)

193-B. (Polish.) **Evaluation of the Work of Czechoslovak Coking Works and Blast Furnaces in the First Five-Year Plan.** A. Ofiok. *Hutnik,* v. 22, nos. 7-8, July-Aug. 1955, p. 265-271.

Figures, for the period from 1949 to 1953, on the utilization of native and foreign iron ores in Czech blast furnaces, including preparation, analysis and use of coke. Tables. 1 ref. (B22, D1, Fe)

194-B. Underground Mining of the Frodingham Ironstone Bed. C. Smith. *Iron and Steel Institute, Journal,* v. 181, Oct. 1955, p. 150-158 + 4 plates.

Method replaces open cast mining of low-grade ore which has valuable self-fluxing properties for making pig iron. Diagrams, photographs, graph. (B12, CI)

195-B. Tubular Grinding Mills. J. Lomas. *Machinery Lloyd (Overseas Ed.),* v. 27, Oct. 8, 1955, p. 89, 91-92.

Design, relative efficiency, use of classifiers, effects of different materials. (B13)

196-B. (Spanish.) **Reduction of Iron Ores Containing Titanium.** Otto Barth. *Instituto del hierro y del acero,* v. 8 no. 36, Apr.-June 1955, p. 149-158.

Separation of iron and titanium concentrates from ilmenite, rutile and titaniferous iron ores. Micrographs, table, graphs, photograph. (B14, Fe, Ti)

197-B. Removal of Copper From Iron-Copper-Carbon Melts by the Use of Sodium Sulfide Slags. Frederick C. Langenberg, Robert W. Lindsay and D. P. Robertson. *Blast Furnace and Steel Plant,* v. 43, Oct. 1955, p. 1142-1147.

Reducing copper content is necessary to improve fabrication by hot working and deep drawing. Tables, graphs. 6 ref. (B21, C, Fe, Cu)

198-B. Metallurgical Coke 1939-1955. II. Production. J. Taylor. *Iron & Steel,* v. 28, Oct. 1955, p. 469-474, 479.

Coal properties and carbonizing conditions on which formation depends. 68 ref. (B22)

199-B. Fluxing Practice for Aluminum Alloys. Walter N. Rossborough. *Precision Metal Molding,* v. 13, Nov. 1955, p. 41 + 6 pages.

Lists ten requirements for satisfactory fluxes and discusses reclamation, degassing and improvement fluxes. Micrographs. (B21, Al)

200-B. (German.) **A Study of the Problem of Extracting the Copper From Siegerland Sparry Ironstone.** Hubert Gleichmann. *Stahl und Eisen,* v. 75, no. 19, Sept. 22, 1955, p. 1233-1241.

Type, extent and results of present methods, further possibilities of extraction. Photographs, micrographs, graphs, diagrams, tables. 5 ref. (B14, Fe, Cu)

201-B. (German.) **Sizing of Lump Ores.** Herbert Pohl. *Stahl und Eisen,* v. 75, no. 20, Oct. 6, 1955, p. 1295-1300.

Effect of size on reduction in blast furnace, charge for sintering process, relationship between coke and ore size, comparison of round aperture and mesh wire screening methods. Tables, diagram. 2 ref. (B13, D1, Fe)

202-B. (Russian.) **Heating of Coal by High-Frequency Current.** S. G. Aronov and Iu. B. Tiutiunnikov. *Stal',* v. 15, no. 9, Sept. 1955, p. 771-776.

Rapid heating of coal charge with low energy loss up to the stage of transition of semicoke into coke; effect of appearance of electroconductivity in material on dielectric heating; semicoke obtained by this process compared with thermal-process coke. Graphs, diagrams, tables, photograph. 9 ref. (B18)

203-B. (Slovenian.) **Importance of the Solubility of Copper Oxide and Ferric Oxide in Acid and Ammonia Leaching Solvents for the Hydrometallurgy of Copper.** Krsto Cazafura and Boris Mejac. *Rudarsko-metalurski zbornik,* 1955, no. 2, p. 101-126.

To achieve the maximum solubility in water and in dilute acids for copper and the minimum for iron, sulfating roasting of sulfide copper ores must be done at 600 to 650° C. Tables, graphs, photographs. 6 ref. (B15, Cu, Fe)

C

Nonferrous Extraction and Refining

178-C. Aluminum, Light Metals King. Kenneth M. Reese, A. F. Garcia and R. A. Lewis, *Industrial and Engineering Chemistry,* v. 47, Oct. 1955, p. 2066-2072.

Raw materials, equipment and operation of electrolytic aluminum refinery. Photographs, flowsheets tables. 7 ref. (C23, Al)

179-C. Zone Melting of Decomposing Solids. J. van den Boomgaard, F. A. Kröger and H. J. Vink. *Journal of Electronics,* v. 1, ser. 1, Sept. 1955, p. 212-217.

Method which makes it possible to apply the technique in systems which would otherwise decompose. Diagrams, graphs. 12 ref. (C5)

180-C. Continuous Casting. J. S. Smart, Jr. *Metal Progress,* v. 68, Oct. 1955, p. 117-125.

Comparisons of various processes for aluminum, magnesium, copper and steel. Photographs, diagrams, table. (C5, D9, Al, Cu, Mg, ST)

181-C. (German.) **Treatment of Melts for the Casting of Aluminum Ingots.** A. Roth. *Aluminium,* v. 31, no. 10, Oct. 1955, p. 484-489.

Avoiding gas uptake and oxide skin formation on molten metal, routine determination of gas content. Photographs, graph, diagrams. 23 ref. (C5, Al)

182-C. (German.) **Development of Induction-Heated High-Vacuum Smelting Plants.** Otto Winkler. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 100, nos. 7-8, July-Aug. 1955, p. 207-214.

Different stages of induction heated vacuum smelting apparatus; cost distribution of the plant components; perspective improvement problems. Diagrams, photographs. 4 ref. (C25, C21)

183-C. (German.) **Fundamentals and Limits of Vacuum Smelting Engineering.** Walter Deisinger. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 100, nos. 7-8, July-Aug. 1955, p. 214-219.

Factors influencing the vacuum capacity in smelting; ways for improvement. Table, photographs, graphs, diagrams. 10 ref. (C25, C21)

184-C. (German.) **High Vacuum Electric Arc Smelting of High Melting Metals.** F. Benesovsky, K. Sedlatschek and W. Wirth. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 100, nos. 7-8, July-Aug. 1955, p. 219-224.

Methods and apparatus for smelting tungsten, molybdenum, tantalum, columbium, titanium and zirconium. Diagrams, graphs, photographs, table. 13 ref. (C25, Mo, Nb, Ta, Ti, W, Zr)

185-C. On Zone Refining. Joseph L. Birman. *Journal of Applied Physics,* v. 26, Oct. 1955, p. 1195-1197.

Matrix method, used to solve difference equations which describe zone refining of a bar, designed for direct numerical calculation of the solute distribution, after any number of passes, with any initial solute distribution. Graph. 4 ref. (C5)

186-C. (French.) **Continuous Casting of Aluminum.** Erhard Herrmann. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 101-107.

Hunter-Douglas (mold composed of units making two endless chains), Properzi (tri-angular bar cast in V-groove in rotary copper wheel), and semicontinuous (fixed mold) processes. Photographs. 29 ref. (C5, Al)

187-C. (French.) **Earing in Deep-Drawing of Aluminum and Possible Remedies.** Raymond Chevigny. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 109-124; disc., p. 124-125.

Casting device which confers advantages of conventional continuous casting while yielding products which are not more prone to earing than those produced in ingot molds. Tables, micrographs, graph. 10 ref. (C5, G4, Al)

188-C. Preparation of Zirconium Metal. Kenneth Albert Walsh. *Ames Laboratory, Iowa State College (U. S. Atomic Energy Commission),* AECD 3640, July 1950, 57 p.

Preparation conducted in a sealed bomb by an exothermic chemical reduction capable of producing sufficient heat to fuse reaction products. Tables, diagrams. 18 ref. (C general, Zr)

189-C. (German.) **Investigation of the Johnson Method of Aluminum Production.** H. Ginsberg and G. Wilde. *Zeitschrift für Erzbergbau und Metallhüttenwesen,* v. 8, no. 10, Oct. 1955, p. 478-485.

Summary and economic aspects of the entire process, with recommendations for making it feasible. Tables, diagrams, photographs. 20 ref. (C23, A4, Al)

D

Ferrous Reduction and Refining

347-D. Problems of Casting-Pit Refractories. Louise Halm. *British Ceramic Society, Transactions,* v. 54, Sept. 1955, p. 507-537; disc., p. 537-542.

Slag and steel attack on ladle bricks, sleeves, stoppers and nozzles, and bottom-casting refractories. Tables, graphs, photographs. 38 ref. (D9, ST)

348-D. Basic Checkers Proved Economical on Replacement Comparison With Clay. C. C. Benton. *Journal of Metals,* v. 7, Oct. 1955, p. 1088-1089.

Used by Algoma Steel Corp. to increase firing rates for higher productivity per operating hour. Photographs, table. (D2, ST)

349-D. Oxidation of Phosphorus and Manganese During and After Flushing in the Basic Open Hearth. John F. Elliott and Frank W. Luerssen. *Journal of Metals,* v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions,* v. 203, Oct. 1955, p. 1129-1136.

Data indicate that phosphorus and manganese distributions between slag and metal closely approach equilibrium toward end of and just after the flush. Tables, graphs. 10 ref. (D2, Fe, Mn, P)

350-D. (French.) **Simultaneous Desulfurization and Deoxidation in the Basic Converter.** Francis Meunier and Camille Soisson. *Revue de métallurgie,* v. 52, no. 8, Aug. 1955, p. 589-594; disc., p. 594-595.

Simultaneous reaction governed by physico-chemical equilibrium reaction between sulfur and oxygen in solution in metal and between sulfur and oxygen ions in slags. Graphs, tables. 11 ref. (D3, P12, ST)

351-D. (German.) **The Attack of Pig-Iron and Slag on Carbon Stones for Furnaces.** Wolfgang Küntscher and Joachim Holzhey. *Metallurgie,* v. 5, no. 4, Apr. 1955, p. 128-132.

Strong carbon absorption takes place for pig-iron containing much manganate; good cooling is essential. Graphs, tables, micrographs, photographs. 4 ref. (D2, D1, B19, Mn, C, CI)

352-D. (German.) **Application of Sound and Ultrasonics in Metallurgy.** Hans Mathiske. *Metallurgie,* v. 5, no. 5, May 1955, p. 165-169.

Quality improvement of metal melts, blast furnace gas cleaning, waste gas dedusting of Siemens-Martin furnaces. Micrographs, diagrams, table. 11 ref. (D1, D2, A8)

353-D. (German.) **Slag Working in Steel Production.** Wolfgang Küntscher. *Metallurgie,* v. 5, no. 8, Aug. 1955, p. 241-245.

Reasons for good slag regulation in producing high-grade steel. Graphs, diagrams, photograph. 21 ref. (D general, ST)

354-D. (Polish.) **Crisis of the Previous Theories of the Blast Furnace Process.** Wladyslaw Kuczewski. *Hutnik,* v. 22, nos. 7-8, July-Aug. 1955, p. 228-237.

Contemporary theory of the reduction of metal oxides. Chemical reactions in the reduction process, Bell reaction, other phases of blast furnace processes. Diagram, graph, table. (D1, Fe)

355-D. (Polish.) **Primary and Secondary Phenomena in the Blast-Furnace Process.** Wladyslaw Kuczewski. *Hutnik,* v. 22, nos. 7-8, July-Aug. 1955, p. 237-240.

Relation between chemical, thermal and mechanical phenomena in metallurgical processes. Graphs. (D1, Fe)

356-D. (Polish.) **Evaluation and Interpretation of the Methods for Determining the Mechanical Stability of Coke and Its Reactivity.** Andrzej Grossman. *Hutnik,* v. 22, nos. 7-8, July-Aug. 1955, p. 240-246.

Relation of carboxy-reactivity of coke to temperature; other thermal-chemical relations. Graphs, tables. 12 ref. (D1, B18)

357-D. (Polish.) **Melting and Casting of Steels in Vacuum.** H. Zakowa. *Hutnik,* v. 22, nos. 7-8, July-Aug. 1955; *Biuletyn informacyjny, Instytutow ministerstwa hutnictwa,* v. 6, nos. 7-8, 1955, p. 29-32.

Design and use of vacuum furnaces, melting and casting techniques, composition and quality of castings obtained. Diagrams, photograph, micrographs. (D8, ST)

358-D. (Russian.) **Hydrogen in the Metal in the Course of Acid Open-hearth Melting.** M. M. Karnaukhov and A. K. Urazgil'deev. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 8, Aug., p. 93-99.

Variation of composition and temperature of the metal and slag during melting process; presence of hydrogen before and after deoxidizing and alloying additions; effect of furnace and melting conditions. Graphs, table. 2 ref. (D2, ST)

359-D. The Oxygen Steelmaking Process. D. O. Davis. *Iron and Steel Engineer,* v. 32, Oct. 1955, p. 90-96.

Provides additional good quality steelmaking capacity at lower capital and operating costs. Diagrams, photographs, graph. (D general, ST)

360-D. The Reaction of Carbon and Oxygen in Molten Iron. E. T. Turkdogan, L. S. Davis, L. E. Leake and C. G. Stevens. *Iron and Steel Institute, Journal,* v. 181, Oct. 1955, p. 123-128.

Study used furnace atmosphere of carbon monoxide at one atmosphere pressure at 1540 and 1640° C. and at carbon concentrations up to 3.6%. Graphs. 20 ref. (D2, P12, Fe)

361-D. The Relative Merits of Low and High-Sulphur Oil for Open-Hearth Steelmaking. C. A. Edwards. *Iron and Steel Institute, Journal,* v. 181, Oct. 1955, p. 138-147.

Observation of the varying degrees of sulfur pickup when using fuels containing different percentages of sulfur, and a calculation of these effects on the weight and character of slag required for production of steel of different sulfur contents. Tables, graphs. 8 ref. (D2, ST)

362-D. (Russian.) **Forsterite Brick Service in Open-Hearth Furnace.** A. V. Leskov, G. A. Molotkov, A. L. Turubiner and T. I. Litvinova. *Ogneupory,* v. 20, no. 6, 1955, p. 243-254.

Chemical composition of brick before and after service in regenerators; microstructure of brick surface and lower zones; composition of burning gases; factors affecting brick life. Tables, micrographs, photographs, diagrams, graphs (D2)

363-D. Pneumatic Steelmaking Processes. IV. D. J. Carney. *Blast Furnace and Steel Plant,* v. 43, Oct. 1955, p. 1139-1141.

Basic top blown process uses high purity oxygen lance for blowing pig iron. Diagrams, graph. 1 ref. (D3, ST)

364-D. Melting Process Offers Higher Quality Superalloys. W. W. Dvrkacz. *Iron Age,* v. 176, Oct. 27, 1955, p. 75-77.

Results obtained by arc melting under vacuum using consumable electrodes include ingots up to 2000 lb., improved metal cleanliness, lower gas content and close control of solidification rates. Photographs, table. (D8, D5, SG-h)

365-D. Elimination of Carbon in the Open Hearth Furnace. I. Pierre Vallet. *Iron & Steel,* v. 28, Oct. 1955, p. 463-467.

Compilation of experimental data and various ideas concerning mechanism of decarburization. Diagrams, graphs. 8 ref. (To be continued.) (D2, ST)

366-D. Air Purging Stops Metal Porosity. Adam J. Texter. *Steel,* v. 137, Oct. 31, 1955, p. 72, 74.

Method and apparatus for drying regular plant compressed air for flushing the bath. Photograph. (D9, ST, SS, TS)

367-D. Smelting Iron Ore With Anthracite: Bureau of Mines Experimental Blast Furnace. R. C. Buehl and M. B. Royer. *U. S. Bureau of Mines, Report of Investigations* 5165, Aug. 1955, 15 p.

Furnace of 3-ft. diam. hearth, producing 12 tons of metal per day, was operated 2 weeks with various proportions of anthracite replacing coke. Diagram, tables, graphs. 9 ref. (D1, Fe)

368-D. Cleaning of Open Hearth Stack Gases. Leslie Silverman. *Year Book* of American Iron and Steel Institute. p. 267-296.

Scope and magnitude of the gas cleaning problem, developments undertaken to solve problem economically. Tables, micrographs, diagrams, photographs, graph. 5 ref. (D2, A8, ST)

369-D. (Czech.) **Design of Blast-Furnaces With Thin-Walled Shafts.** Svatopluk Cernoch. *Hutnické listy,* v. 10, no. 9, Sept. 1955, p. 513-520.

Experience has shown reduced coke consumption, also lower investment and maintenance costs result from this type of construction. Diagrams. (D1, Fe)

370-D. (German.) **Observations Made Through the Bottom Tuyeres of a Blowing Steel Converter. Effect of Locally High Temperatures on the Chemical Processes.** Gerhard Naeser, Werner Pepperhoff and Helmut Riedel. *Stahl und Eisen,* v. 75, no. 19, Sept. 22, 1955, p. 1244-1251.

Color pyrometer measurements and other examinations show effect of temperatures on nitrogen absorption of heat. Diagrams, graphs, photographs, micrographs, tables. 3 ref. (D3, ST)

371-D. (German.) **Dolomite as a Refractory Material for the Basic Air Refining Process.** Walter Bading. *Stahl und Eisen,* v. 75, no. 20, Oct. 6, 1955, p. 1300-1310.

Considers all phases of preparation, from assaying deposit through sintering to installation of brick. Tables, graphs, micrographs, diagrams, photographs. 17 ref. (D3, B19, ST)

372-D. (German.) **Burning of Converter Bottoms.** Heinz Wübbenhorst. *Stahl und Eisen,* v. 75, no. 20, Oct. 6, 1955, p. 1310-1317.

Charging ratios, burning curves, gas consumption, importance of tar for heat consumption, roof and bottom core temperatures, furnace atmospheres. Graphs, tables, photographs, diagrams. 11 ref. (D3, ST)

373-D. (Book.) **Year Book of American Iron and Steel Institute,** 426 p. 1955. American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y.

Fourteen papers covering the steel industry—its progress and expan-

sion, operating problems, product development, public and industrial relations, and the Ninth Schwab Memorial Lecture.
(D general, A4, A5, ST)

E
Foundry

425-E. Effect of Mould Material on the Solidification Rate of Cast Metals. *Foundry Trade Journal,* v. 99, Sept. 29, 1955, p. 349-354; disc., p. 354-358.
Slush casting experiments with various molding sands and sand additives. Diagrams, tables, graphs, photograph. (E16, E19, E25, CI)

426-E. Pressure Die Casting at the Works of the Wolverhampton Die-Casting Co., Ltd. *Machinery (London),* v. 87, Sept. 30, 1955, p. 789-796.
Considers zinc-base alloy castings and dies in which they are produced. Photographs. (E13, Zn)

427-E. (German.) **Modern Combined Melting and Holding Furnaces in Light Metals Foundries for Sand, Gravity-Die, and Pressure-Die-Casting.** F. Ostler. *Aluminium,* v, 31, no. 10, Oct. 1955 p. 477-483.
Reasons for development of multi-chamber induction furnaces. Study of four examples. Photographs, diagrams, graphs. (E10, E11, E13, EG-a)

428-E. Aluminum Alloy Pattern Match-Plate. Edward Magder. *Canadian Metals,* v. 18, Oct. 1955, p. 39-40, 42.
Key to cost reduction in the foundry. Photographs, table. (E17, Al)

429-E. Intricate Plaster Mold Castings. Kenneth L. Mountain. *Foundry,* v. 83, Nov. 1955, p. 100-106.
Produces accurate, pressure-tight, high-strength and surface-smooth castings that do not require machining. Photographs. (E16)

430-E. The Brass Foundry. Harry St. John. *Foundry,* v. 83, Nov. 1955, p. 107-111.
Flame appearance check, charcoal cover, carbonaceous material, charging furnace, furnace atmosphere, refractory maintenance, water vapor and correct moment for pouring. Photographs. (E10, Cu)

431-E. Gun-Metal Bronze Castings. W. H. Johnson, H. F. Bishop and W. S. Pellini. *Foundry,* v. 83, Nov. 1955, p. 120-127.
Comparing methods of improving soundness, vacuum treatment of melts reduces gas content of metal to prevent precipitation of gas during solidification, and, by accentuating directional feeding, wedge chilling permits more nearly complete feeding. Photographs, diagrams, micrographs, graphs. 4 ref. (E25, Cu)

432-E. What Happens When a Core Is Baked? Carl E. Schubert. *Foundry,* v. 83, Nov. 1955, p. 128-130.
Laboratory experiments to determine temperature reactions and role of oxygen during core baking cycle. Graphs, diagrams. (E21)

433-E. The Use and Function of Chills and Sand Molds. W. M. Halliday. *Foundry,* v. 83, Nov. 1955, p. 162, 165-166, 168.
Principles and purposes of chills, materials, dressings, venting and shape. (E11, E19)

434-E. Displacement Casting. H. K. Barton. *Mechanical World and Engineering Record,* v. 135, Oct. 1955, p. 460-462.
Two modifications of the basic Cothias process have recently come into use, as an alternative to die casting, for small quantities of speculative items. Diagrams. (E13, E16)

435-E. Die Castings Did It. *Modern Metals,* v. 11, Oct. 1955, p. 44, 48.
Magnesium and aluminum dies are used to make wide-screen motion picture projection lens. Photographs, table. (E13, Mg, Al)

436-E. (French.) **The Solidification of Light Alloys—Study of Shrinkage.** André Tatur. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 89-100.
Carried out on specimens with conical top of type recommended by Portevin and Bastien. Diagrams, photographs, table, graphs. 7 ref. (E25, EG-a)

437-E. (German.) **Development of Measurement and Control Techniques for Hot Air Cupola Furnaces.** Fritz von Mertz. *Giesserei,* v. 42, no. 20, Sept. 29, 1955, p. 549-551.
Wind, temperature, cooling and combustion air, pressure, carbon monoxide and carbon dioxide measurement methods and construction of control panels. Photograph, graphs, diagrams. (E10, S16, S18, ST)

438-E. (Spanish.) **Experiments on the Use of Oxygen and Hot Blast in the Classical Cupola.** Jaime Galve. *Instituto del hierro y der acero,* v. 8, no. 36, Apr.-June 1955, p. 159-170.
Results of experiences in Spanish cupolas for improving the coke characteristics. Graphs, diagrams, photograph. 22 ref. (E10)

439-E. Chemical Reactions in the Cupola. G. A. H. Jungbluth and K. Stockkamp. *Foundry Trade Journal,* v. 99, Oct. 6, 1955, p. 377-387.
By increasing the temperature in the reaction zone and reducing the iron and manganese oxides and silica, a transfer of phosphorus from the charge to the iron as well as reduction of sulfur content in the iron will take place when cupola is operated with acid slag. Tables, graphs, 23 ref. (To be continued.) (E10, CI)

440-E. Recommended Melting Practice for Small Heats. I. Nicholas J. Grant. *Precision Metal Molding,* v. 13, Nov. 1955, p. 32-33, 71-73.
General and specific problems encountered in investment casting. Tables. (E15)

441-E. (Czech.) **Effect of Feeding Rate of Metal in Casting Upon Its Inner Quality.** Stanislav Simonik. *Slévarenstvi,* v. 3, no. 9, Sept. 1955, p. 258-260.
Analysis of solidification and feeding mechanism shows that shrinkage is directly related to solidification velocity and can be controlled by correct design. Diagrams. 5 ref. (E25)

442-E. (Czech.) **Production of Pump Wheel Castings.** Vitezslav Batek and Jan Cechura. *Slévarenstvi,* v. 3, no. 9, Sept. 1955, p. 273-274.
Design measures to reduce expansion scabs, sand inclusions, gas holes, cold shuts, and hot tears for defect-free castings. Diagram, photographs. (E general)

443-E. (German.) **Fundamentals of Vibration Treatment in Metallurgy.** H. J. Seemann and H. Staats. *Metall,* v. 9, nos. 19-20, Oct. 1955, p. 868-877.
Use of intensive mechanical vibrations in the treatment of metal parts and melts. Diagrams, graphs. 17 ref. (E24)

444-E. (Italian.) **Granular Mineral Black.** *Fonderia,* v. 4, no. 9, Sept. 1955, p. 409-414.
Observations and experiences using mineral black in Italy in molding sands. Graphs, micrographs, table. (E18)

445-E. (Russian.) **Pressure Casting of Copper Alloys.** V. M. Pliatskii. *Liteinoe proizvodstvo,* 1955, no. 9, Sept., p. 4-7.
Critical factors involved, relating to the casting procedure and mold specifications. Diagrams, tables, photographs. (E13, Cu)

446-E. (Russian.) **Importance of the Fuel Quality for Equipment in the Casting Industry.** L. M. Marienbakh. *Liteinoe proizvodstvo,* 1955, no. 9, Sept., p. 7-9.
Calculation of cast iron temperatures in relation to fuel economy; suggestions for increasing the efficiency of cupola furnaces; processes in the reduction zone. Nomogram. 6 ref. (E10, CI)

447-E. (Russian.) **Experiment in the Operation and Use of Water Cooled Cupola Furnaces.** N. A. Barinov. *Liteinoe proizvodstvo,* 1955, no. 9, Sept., p. 9-12.
Design of cupolas; comparison of yield, temperature factors, fuel consumed and repair requirements for water-cooled and nonwater-cooled cupolas; chemical composition of slags; cupola for melting spheroidal cast iron. Tables, diagrams, micrographs. (E10, E25, CI)

448-E. (Russian.) **Behavior of Hydrogen in Metals, Under the Influence of Direct Current.** D. P. Lovtsov. *Liteinoe proizvodstvo,* 1955, no. 9, Sept., p. 15-19.
Various forms in which hydrogen occurs in metals; problems of gas inclusions in metals and causes of porosity; effect on mechanical properties of castings. Diagrams, photographs, table. 5 ref. (E25, Al, Mg)

449-E. (Russian.) **Quality of Castings in Relation to Thermal Resistance of Molds and Cores.** N. P. Nikolaichik. *Liteinoe proizvodstvo,* 1955, no. 9, Sept., p. 20-22.
Evaluation of fire-clay, sand and special mixtures for molds and cores; effect of bottom pouring. Micrographs, tables. 3 ref. (E11, E18, CI)

450-E. (Swedish.) **The Sulfur Index (S)/[S] as a Function of the Components of the Slag in the Metallurgical Blast Cupola.** Jörgen Drachmann. *Gjuteriet,* v. 45, no. 7, July 1955, p. 89-95.
The basicity index $CaO\text{-}SiO_2$ gives a good measure of the effect of the slag composition on the sulfur index. Diagrams, tables, graphs. 5 ref. (E10)

451-E. (Book.) **Principles of Metal Casting.** Richard W. Heine and Philip C. Rosenthal. 639 p. 1955. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y. $7.50.
Textbook designed for college courses in metallurgical and mechanical engineering. For the former, emphasis is placed on the aspects of foundry processes and materials; the latter group is given a survey of the principles of processes and the proper utilization of castings for engineering purposes.
(E general)

F
Primary Mechanical Working

248-F. Establishing Soaking Pit Schedules From Mill Loads. R. D. Hindson and J. Sibakin. *Journal of*

D

Ferrous Reduction and Refining

347-D. Problems of Casting-Pit Refractories. Louise Halm. *British Ceramic Society, Transactions*, v. 54, Sept. 1955, p. 507-537; disc., p. 537-542.

Slag and steel attack on ladle bricks, sleeves, stoppers and nozzles, and bottom-casting refractories. Tables, graphs, photographs. 38 ref. (D9, ST)

348-D. Basic Checkers Proved Economical on Replacement Comparison With Clay. C. C. Benton. *Journal of Metals*, v. 7, Oct. 1955, p. 1088-1089.

Used by Algoma Steel Corp. to increase firing rates for higher productivity per operating hour. Photographs, table. (D2, ST)

349-D. Oxidation of Phosphorus and Manganese During and After Flushing in the Basic Open Hearth. John F. Elliott and Frank W. Luerssen. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Oct. 1955, p. 1129-1136.

Data indicate that phosphorus and manganese distributions between slag and metal closely approach equilibrium toward end of and just after the flush. Tables, graphs. 10 ref. (D2, Fe, Mn, P)

350-D. (French.) **Simultaneous Desulfurization and Deoxidation in the Basic Converter.** Francis Meunier and Camille Soisson. *Revue de métallurgie*, v. 52, no. 8, Aug. 1955, p. 589-594; disc., p. 594-595.

Simultaneous reaction governed by physico-chemical equilibrium reaction between sulfur and oxygen in solution in metal and between sulfur and oxygen ions in slags. Graphs, tables. 11 ref. (D3, P12, ST)

351-D. (German.) **The Attack of Pig-Iron and Slag on Carbon Stones for Furnaces.** Wolfgang Küntscher and Joachim Holzhey. *Metallurgie*, v. 5, no. 4, Apr. 1955, p. 128-132.

Strong carbon absorption takes place for pig-iron containing much manganate; good cooling is essential. Graphs, tables, micrographs, photographs. 4 ref. (D2, D1, B19, Mn, C, CI)

352-D. (German.) **Application of Sound and Ultrasonics in Metallurgy.** Hans Mathiske. *Metallurgie*, v. 5, no. 5, May 1955, p. 165-169.

Quality improvement of metal melts, blast furnace gas cleaning, waste gas dedusting of Siemens-Martin furnaces. Micrographs, diagrams, table. 11 ref. (D1, D2, A8)

353-D. (German.) **Slag Working in Steel Production.** Wolfgang Küntscher. *Metallurgie*, v. 5, no. 8, Aug. 1955, p. 241-245.

Reasons for good slag regulation in producing high-grade steel. Graphs, diagrams, photograph. 21 ref. (D general, ST)

354-D. (Polish.) **Crisis of the Previous Theories of the Blast Furnace Process.** Wladyslaw Kuczewski. *Hutnik*, v. 22, nos. 7-8, July-Aug. 1955, p. 228-237.

Contemporary theory of the reduction of metal oxides. Chemical reactions in the reduction process, Bell reaction, other phases of blast furnace processes. Diagram, graph, table. (D1, Fe)

355-D. (Polish.) **Primary and Secondary Phenomena in the Blast-Furnace Process.** Wladyslaw Kuczewski. *Hutnik*, v. 22, nos. 7-8, July-Aug. 1955, p. 237-240.

Relation between chemical, thermal and mechanical phenomena in metallurgical processes. Graphs. (D1, Fe)

356-D. (Polish.) **Evaluation and Interpretation of the Methods for Determining the Mechanical Stability of Coke and Its Reactivity.** Andrzej Grossman. *Hutnik*, v. 22, nos. 7-8, July-Aug. 1955, p. 240-246.

Relation of carboxy-reactivity of coke to temperature; other thermal-chemical relations. Graphs, tables. 12 ref. (D1, B18)

357-D. (Polish.) **Melting and Casting of Steels in Vacuum.** H. Zakowa. *Hutnik*, v. 22, nos. 7-8, July-Aug. 1955; *Biuletyn informacyjny, Instytutow ministerstwa hutnictwa*, v. 6, nos. 7-8, 1955, p. 29-32.

Design and use of vacuum furnaces, melting and casting techniques, composition and quality of castings obtained. Diagrams, photograph, micrographs. (D8, ST)

358-D. (Russian.) **Hydrogen in the Metal in the Course of Acid Open-hearth Melting.** M. M. Karnaukhov and A. K. Urazgil'deev. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk*, 1955, no. 8, Aug., p. 93-99.

Variation of composition and temperature of the metal and slag during melting process; presence of hydrogen before and after deoxidizing and alloying additions; effect of furnace and melting conditions. Graphs, table. 2 ref. (D2, ST)

359-D. The Oxygen Steelmaking Process. D. O. Davis. *Iron and Steel Engineer*, v. 32, Oct. 1955, p. 90-96.

Provides additional good quality steelmaking capacity at lower capital and operating costs. Diagrams, photographs, graph. (D general, ST)

360-D. The Reaction of Carbon and Oxygen in Molten Iron. E. T. Turkdogan, L. S. Davis, L. E. Leake and C. G. Stevens. *Iron and Steel Institute, Journal*, v. 181, Oct. 1955, p. 123-128.

Study used furnace atmosphere of carbon monoxide at one atmosphere pressure at 1540 and 1640° C. and at carbon concentrations up to 3.6%. Graphs. 20 ref. (D2, P12, Fe)

361-D. The Relative Merits of Low and High-Sulphur Oil for Open-Hearth Steelmaking. C. A. Edwards. *Iron and Steel Institute, Journal*, v. 181, Oct. 1955, p. 138-147.

Observation of the varying degrees of sulfur pickup when using fuels containing different percentages of sulfur, and a calculation of these effects on the weight and character of slag required for production of steel of different sulfur contents. Tables, graphs. 8 ref. (D2, ST)

362-D. (Russian.) **Forsterite Brick Service in Open-Hearth Furnace.** A. V. Leskov, G. A. Molotkov, A. L. Turubiner and T. I. Litvinova. *Ogneupory*, v. 20, no. 6, 1955, p. 243-254.

Chemical composition of brick before and after service in regenerators; microstructure of brick surface and lower zones; composition of burning gases; factors affecting brick life. Tables, micrographs, photographs, diagrams, graphs (D2)

363-D. Pneumatic Steelmaking Processes. IV. D. J. Carney. *Blast Furnace and Steel Plant*, v. 43, Oct. 1955, p. 1139-1141.

Basic top blown process uses high purity oxygen lance for blowing pig iron. Diagrams, graph. 1 ref. (D3, ST)

364-D. Melting Process Offers Higher Quality Superalloys. W. W. Dvrkacz. *Iron Age*, v. 176, Oct. 27, 1955, p. 75-77.

Results obtained by arc melting under vacuum using consumable electrodes include ingots up to 2000 lb., improved metal cleanliness, lower gas content and close control of solidification rates. Photographs, table. (D8, D5, SG-h)

365-D. Elimination of Carbon in the Open Hearth Furnace. I. Pierre Vallet. *Iron & Steel*, v. 28, Oct. 1955, p. 463-467.

Compilation of experimental data and various ideas concerning mechanism of decarburization. Diagrams, graphs. 8 ref. (To be continued.) (D2, ST)

366-D. Air Purging Stops Metal Porosity. Adam J. Texter. *Steel*, v. 137, Oct. 31, 1955, p. 72, 74.

Method and apparatus for drying regular plant compressed air for flushing the bath. Photograph. (D9, ST, SS, TS)

367-D. Smelting Iron Ore With Anthracite: Bureau of Mines Experimental Blast Furnace. R. C. Buehl and M. B. Royer. *U. S. Bureau of Mines, Report of Investigations* 5165, Aug. 1955, 15 p.

Furnace of 3-ft. diam. hearth, producing 12 tons of metal per day, was operated 2 weeks with various proportions of anthracite replacing coke. Diagram, tables, graphs. 9 ref. (D1, Fe)

368-D. Cleaning of Open Hearth Stack Gases. Leslie Silverman. *Year Book* of American Iron and Steel Institute. p. 267-296.

Scope and magnitude of the gas cleaning problem, developments undertaken to solve problem economically. Tables, micrographs, diagrams, photographs, graph. 5 ref. (D2, A8, ST)

369-D. (Czech.) **Design of Blast-Furnaces With Thin-Walled Shafts.** Svatopluk Cernoch. *Hutnické listy*, v. 10, no. 9, Sept. 1955, p. 513-520.

Experience has shown reduced coke consumption, also lower investment and maintenance costs result from this type of construction. Diagrams. (D1, Fe)

370-D. (German.) **Observations Made Through the Bottom Tuyeres of a Blowing Steel Converter. Effect of Locally High Temperatures on the Chemical Processes.** Gerhard Naeser, Werner Pepperhoff and Helmut Riedel. *Stahl und Eisen*, v. 75, no. 19, Sept. 22, 1955, p. 1244-1251.

Color pyrometer measurements and other examinations show effect of temperatures on nitrogen absorption of heat. Diagrams, graphs, photographs, micrographs, tables. 3 ref. (D3, ST)

371-D. (German.) **Dolomite as a Refractory Material for the Basic Air Refining Process.** Walter Bading. *Stahl und Eisen*, v. 75, no. 20, Oct. 6, 1955, p. 1300-1310.

Considers all phases of preparation, from assaying deposit through sintering to installation of brick. Tables, graphs, micrographs, diagrams, photographs. 17 ref. (D3, B19, ST)

372-D. (German.) **Burning of Converter Bottoms.** Heinz Wübbenhorst. *Stahl und Eisen*, v. 75, no. 20, Oct. 6, 1955, p. 1310-1317.

Charging ratios, burning curves, gas consumption, importance of tar for heat consumption, roof and bottom core temperatures, furnace atmospheres. Graphs, tables, photographs, diagrams. 11 ref. (D3, ST)

373-D. (Book.) **Year Book of American Iron and Steel Institute**, 426 p. 1955. American Iron and Steel Institute, 350 Fifth Ave., New York 1, N. Y.

Fourteen papers covering the steel industry—its progress and expan-

sion, operating problems, product development, public and industrial relations, and the Ninth Schwab Memorial Lecture.
(D general, A4, A5, ST)

E
Foundry

425-E. Effect of Mould Material on the Solidification Rate of Cast Metals. *Foundry Trade Journal*, v. 99, Sept. 29, 1955, p. 349-354; disc., p. 354-358.
Slush casting experiments with various molding sands and sand additives. Diagrams, tables, graphs, photograph. (E16, E19, E25, CI)

426-E. Pressure Die Casting at the Works of the Wolverhampton Die-Casting Co., Ltd. *Machinery (London)*, v. 87, Sept. 30, 1955, p. 789-796.
Considers zinc-base alloy castings and dies in which they are produced. Photographs. (E13, Zn)

427-E. (German.) Modern Combined Melting and Holding Furnaces in Light Metals Foundries for Sand, Gravity-Die, and Pressure-Die-Casting. F. Ostler. *Aluminium*, v, 31, no. 10, Oct. 1955 p. 477-483.
Reasons for development of multi-chamber induction furnaces. Study of four examples. Photographs, diagrams, graphs. (E10, E11, E13, EG-a)

428-E. Aluminum Alloy Pattern Match-Plate. Edward Magder. *Canadian Metals*, v. 18, Oct. 1955, p. 39-40, 42.
Key to cost reduction in the foundry. Photographs, table. (E17, Al)

429-E. Intricate Plaster Mold Castings. Kenneth L. Mountain. *Foundry*, v. 83, Nov. 1955, p. 100-106.
Produces accurate, pressure-tight, high-strength and surface-smooth castings that do not require machining. Photographs. (E16)

430-E. The Brass Foundry. Harry St. John. *Foundry*, v. 83, Nov. 1955, p. 107-111.
Flame appearance check, charcoal cover, carbonaceous material, charging furnace, furnace atmosphere, refractory maintenance, water vapor and correct moment for pouring. Photographs. (E10, Cu)

431-E. Gun-Metal Bronze Castings. W. H. Johnson, H. F. Bishop and W. S. Pellini. *Foundry*, v. 83, Nov. 1955, p. 120-127.
Comparing methods of improving soundness, vacuum treatment of melts reduces gas content of metal to prevent precipitation of gas during solidification, and, by accentuating directional feeding, wedge chilling permits more nearly complete feeding. Photographs, diagrams, micrographs, graphs. 4 ref. (E25, Cu)

432-E. What Happens When a Core Is Baked? Carl E. Schubert. *Foundry*, v. 83, Nov. 1955, p. 128-130.
Laboratory experiments to determine temperature reactions and role of oxygen during core baking cycle. Graphs, diagrams. (E21)

433-E. The Use and Function of Chills and Sand Molds. W. M. Halliday. *Foundry*, v. 83, Nov. 1955, p. 162, 165-166, 168.
Principles and purposes of chills, materials, dressings, venting and shape. (E11, E19)

434-E. Displacement Casting. H. K. Barton. *Mechanical World and Engineering Record*, v. 135, Oct. 1955, p. 460-462.
Two modifications of the basic Cothias process have recently come into use, as an alternative to die casting, for small quantities of speculative items. Diagrams. (E13, E16)

435-E. Die Castings Did It. *Modern Metals*, v. 11, Oct. 1955, p. 44, 48.
Magnesium and aluminum dies are used to make wide-screen motion picture projection lens. Photographs, table. (E13, Mg, Al)

436-E. (French.) The Solidification of Light Alloys—Study of Shrinkage. André Tatur. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 89-100.
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Use of intensive mechanical vibrations in the treatment of metal parts and melts. Diagrams, graphs. 17 ref. (E24)

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445-E. (Russian.) Pressure Casting of Copper Alloys. V. M. Pliatskii. *Liteinoe proizvodstvo*, 1955, no. 9, Sept., p. 4-7.
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243-F. Establishing Soaking Pit Schedules From Mill Loads. R. D. Hindson and J. Sibakin. *Journal of*

Metals, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Oct. 1955, p. 1105-1112.

Heating temperatures, soaking times, pit capacity and safe mill drafts correlated with fluctuations in current or load of bloom mill driving motor. Graphs, tables. (F21, ST)

249-F. Maintenance of Quality in Aluminum Sheet Rolling Oils. J. O. McLean. *Lubrication Engineering*, v. 11, Sept.-Oct. 1955, p. 337-339.

Elaborate adsorptive clay by-pass filter system keeps oil fairly clean but has some disadvantages. Diagram, photographs, micrograph. (F1, F23, Al)

250-F. Promotion of Fluid Lubrication in Wire-Drawing. II. D. G. Christopherson. *Wire Industry*, v. 22, Sept. 1955, p. 885-887.

Comparison of fluid and soap lubricants, drawing force tests, effect of lubricant flow, comparison of wear with soap and oil. Tables. 8 ref. (F1, F28)

251-F. How to Extrude Alcan 50S Aluminum Alloy. B. W. Bischof and J. F. Whiting. *Modern Metals*, v. 11, Oct. 1955, p. 34-36, 38-39.

Success depends on mechanics of metal flow. Extrusion defects, causes and cures, heat treatments and properties of Alcan 50S. Micrographs, photographs, tables, graphs. (F24, Al)

252-F. The Rolling of Metals and Alloys. VI. A Study of the Influence of Coiler and Decoiler Tension on the Magnitude of the Rolling Load. E. C. Larke. *Sheet Metal Industries*, v. 32, no. 342, Oct. 1955, p. 781-785.

Includes tables, graphs. 4 ref. (To be continued.) (F23)

253-F. Development of a Die Block for Closed Die Forging. John A. Succop. *Steel Processing*, v. 41, Oct. 1955, p. 621-635.

History of drop forge die block, manufacture of Hardtem die blocks, development of dies for mechanical press and large hydraulic presses. Photographs, graphs, micrographs. (F22)

254-F. Study of Die Wear by Means of Radio-Activated Surfaces. B. J. Jaoul. *Steel Processing*, v. 41, Oct. 1955, p. 636-641.

Surface radio-activation permits precise determination of location of wear in which the autoradiographic method maps the relief of the die and is then calibrated against Geiger-Muller tube measurements. Graphs, diagrams, radiographs. (F24, S19)

255-F. (French.) **Production of Large Diameter Aluminum Wire by the Continuous Machine.** Ugo Lecis and B. Panebianco. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 151-155; disc., p. 155.

Adaptation of Properzi "continuous" machine to casting of large diameter aluminum wire. Photographs, micrographs, graphs. (F28, Al)

256-F. Tube-Forming Techniques Simplify Structural Assemblies. F. J. Pesak. *Iron Age*, v. 176, Oct. 27, 1955, p. 78-80.

Airframe manufacturers spin, swage, impact extrude and gather to eliminate inefficient joining methods. Photographs. (F26)

257-F. Titanium Extrusion—A New Fabricating Technique. I-II. A. M. Sabroff, W. M. Parris and P. D. Frost. *Iron Age*, v. 176, Oct. 27, 1955, p. 81-84; Nov. 3, 1955, p. 101-103.

Successful extrusion depends on extrusion temperature, die design, material and lubrication. Carbide dies and proper lubricant gave best results and proved most efficient. Graphs, micrographs, photographs, diagram. (F24, F1, Ti)

258-F. Factors Affecting the Characteristics of $Ca(OH)_2$ in Suspension, With Special Reference to the Wire Drawing Industry. Thomas C. Miller. *Wire and Wire Products*, v. 30, Oct. 1955, p. 1212 + 6 pages.

Crystalline calcium hydroxide can be produced on heated bodies submerged in suspensions of it. Photographs, tables, micrographs. (F28)

259-F. Wax Lubricants in Non-Ferrous Wire Drawing. John Werner. *Wire and Wire Products*, v. 30, Oct. 1955, p. 1223-1225.

Different lubricants for copper and aluminum wire which will facilitate passage of wire through die and will disperse the heat generated by friction and deformation of metal. (F1, F28, Cu, Al)

260-F. Drawing and Processing of Titanium Wire. Douglas H. Wilson. *Wire and Wire Products*, v. 30, Oct. 1955, p. 1246-1247, 1305.

Investigation of lubricants, coatings, dies, center condition and developments at Crucible-Syracuse. (F28, Ti)

261-F. (German.) **Rolling Properties of Transformer Steels With More Than 3.3% Silicon Content.** Franz Lihl and Paul Zemsch. *Archiv für das Eisenhüttenwesen*, v. 26, no. 10, Oct. 1955, p. 599-602.

Ductility limits of steel with 4.3% silicon and 0.25% aluminum; experiments with preheated alloys; conditions for rolling high-silicon transformer steels; influence of peg count on rolling. Graphs, table, photographs. 6 ref. (F23, Q23, AY)

262-F. (German.) **Light Metal Forging With the Horizontal Forging Machine.** B. Preuss. *Metall*, v. 9, nos. 19-20, Oct. 1955, p. 883-885.

Advantages and characteristics, methods of dimensional calculation, with emphasis on magnesium alloys. Diagrams, tables. (F22, EG-a)

G
Secondary Mechanical Working

292-G. New Development in Flame Cutting. *Welding and Metal Fabrication*, v. 23, Oct. 1955, p. 392-396.

Fully automatic machine uses photographic control method. Photographs, table. (G22)

293-G. (Czech.) **Evaluation of the Present State of Machining With Sintered Corundum.** F. Vintner and J. Preisler. *Strojirenstvi*, v. 5, no. 3, Mar. 1955, p. 199-203.

Effect of quality and cutting angles of disks on cutting power; recommendations based on Czech and Soviet plant practice; use of ceramic disks in discontinuous machining; face-milling of cast iron; durability of ceramic milling cutters and knives. Diagrams, graphs, table. 5 ref. (G18, G17, CI)

294-G. (Dutch.) **Considerations for the Machinability of Steel.** B. L. ten Horn. *Metalen*, v. 10, no. 17, Sept. 15, 1955, p. 357-363.

Various machinability tests for high-speed steels and hard metals. Graphs, diagrams. 6 ref. (G17, TS, EG-d)

295-G. (German.) **Metal Removal Machining of Aluminum Alloy by Means of Hard-Metal Tools.** J. Witthoff. *Technische Mitteilungen Krupp*, v. 13, no. 5, Sept. 1955, p. 110-117.

Review of hard metal cutting tools and tips, with consideration to particular working types and manufactured items. Cutting metal composition. Graphs, tables, diagrams, photographs. 9 ref. (G17, Al)

296-G. (German.) **Rollers of Hard Metal.** J. Hinnüber and H. D. Dietze. *Technische Mitteilungen Krupp*, v. 13, no. 5, Sept. 1955, p. 118-120.

Application and economies of hard-metal rollers, effect on the machined metal. Photographs, diagrams, table. (G11, G17, EG-d)

297-G. (Russian.) **Electrospark Machining of Metals.** B. R. Lazarenko and N. I. Lazarenko. *Elektrichestvo*, 1955, no. 8, Aug., p. 63-68.

Background of method since its discovery, types of electrosparking machines and their operational details in cutting, application of metallic coatings, surface hardening, machining. Photographs, micrograph, diagram. 8 ref. (G17)

298-G. (Russian.) **Industrial Production of Cylindrical Gears by Hot Rolling.** A. D. Kuz'min and M. V. Vasil'chikov. *Vestnik mashinostroniia*, v. 35, no. 9, Sept. 1955, p. 41-44.

Wear and strength tests show that the teeth of gears thus produced are superior to milled ones. Diagrams, photographs, table, graph. (G11, Q9, Q27, ST)

299-G. The Press Brake—as a Production Tool. V. Punching. L. F. Spencer. *Heating & Air Conditioning Contractor*, v. 47, Oct. 1955, p. 58 + 4 pages.

Pressure required, use of "stepped" punches, punch and die clearance, slug disposal. Photograph, table, diagrams. (G2, CN)

300-G. Automatic Control of Complete Machining Cycles. *Machinery Lloyd (Overseas Ed.)*, v. 27, Oct. 8, 1955, p. 79-80.

All machine movements and auxiliary functions are controlled by magnetic tape program prepared electronically from numerical data, derived from drawings of parts. Photographs. (G17, S18)

301-G. Clad Steel Flame Cut Without Powder. *Metal-Working*, v. 11, Nov. 1955, p. 4-5.

Smooth, narrow kerf easily produced by modified technique. Photographs, table, diagram. (G22, ST)

302-G. Pinions Shaped and Sized Automatically. *Metal-Working*, v. 11, Nov. 1955, p. 6-7.

Cutter hone triples quantity of gears between sharpenings. Photographs, diagram. (G17)

303-G. Drawing Dies for Stainless Steels Require Modifications. XXVIII. Stanley R. Cope. *Metalworking Production*, v. 99, Oct. 7, 1955, p. 1714-1716.

Choice of suitable die materials is necessary to avoid scratches and score marks. Diagrams. (To be continued.) (G4, T5, Ni, SS)

304-G. Jet-Action Cutting. *Modern Metals*, v. 11, Oct. 1955, p. 40, 42.

New process rips through aluminum plate at up to 300 in. per min. with no ill effect on metal properties. Photographs, diagrams. (G22, Al)

305-G. Bend Forming Tapered Wing Plates for the First Multi-Jet Seaplane. J. C. Spurgeon. *Modern Metals*, v. 11, Oct. 1955, p. 68.

Bends are produced by 6-in. radius top die point; end-to-end taper of aluminum plates is produced by adjusting top die girder. Photographs. (G6, T24, Al)

306-G. The Blanking and Piercing of Thin Foil Stock. W. M. Halliday.

Sheet Metal Industries, v. 32, no. 342, Oct. 1955, p. 741-744.

Stack blanking, storing and separating foil parts. (G2, Sn)

307-G. Transfer Presses—Some Aspects of Their Advantages and Use in the Sheet-Metal Industry. *Steel Processing*, v. 41, Oct. 1955, p. 643-646.

Use for components requiring a series of press operations, and where large quantities are required. Photographs, diagrams. (G1, CN)

308-G. How to Fabricate Plastic-Faced Dies. Walter A. Hockett. *Tool Engineer*, v. 35, Nov. 1955, p. 87-90.

Dies can be produced in less time and with lower cost, life is increased as much as ten times and faithfully fine details are formed in workpieces. Photographs. (G9)

309-G. Heavy Surface Grinding. II. John E. Hyler. *Western Machinery and Steel World*, v. 46, Oct. 1955, p. 84-87.

At each revolution of large-diameter chuck or work table, a workpiece travels beneath 2, 3, 4 or 5 wheels, each of which has a grinding task. Photographs. (To be continued.) (G18)

310-G. Grinding Titanium With Coated Abrasive Belts. Hugh N. Dyer. *Western Machinery and Steel World*, v. 46, Oct. 1955, p. 142.

Successful grinding depends on reducing wear by lowering temperature at grinding point and using fluids which form protective films over freshly cut surfaces. 2 ref. (G18, G21, Ti)

311-G. (French.) The Formation of Ears in the Drawing of Aluminum Sheet. Gustav Siebel. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 127-136; disc., p. 136-137.

Study of various factors influencing ear formation and research on condition favoring nearly isotropic behavior of sheets. Photograph, diagrams, graphs, table. 8 ref. (G4, Al)

312-G. (French.) Anisotropy of Pure Aluminum Sheet—Earing in Deep-Drawing. Guy Trapied. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 139-149; disc., p. 150.

New continuous casting process consists of spraying on ingot, below spray ring, water atomized by air under pressure; slower cooling assures sufficient isotropy to suppress ear formation during drawing. Diagrams, photographs. (G4, C5, Al)

313-G. Make the Most of Aluminum. *Automatic Machining*, v. 17, Nov. 1955, p. 31-35.

Problems in machining in automatic bar machines can be dissipated by proper tool geometry and correct speeds and feeds. Diagrams, tables. (To be continued.) (G17, Al)

314-G. Strengthening Steel Structures by Means of Prestressing. Rudolph Szilard, Jr. *Engineering Journal*, v. 38, Oct. 1955, p. 1379-1381.

Design equations. Technique should become widely used because of economical and other advantages. Diagrams, photographs. (G22, Al)

315-G. You Can Cut Aluminum Plate at Speeds up to 300 Inches a Minute. *Industry & Welding*, v. 28, Nov. 1955, p. 40 + 7 pages.

Application of a new inert-arc (Heliarc) process whose shield is an argon-hydrogen gas-shielded arc. Diagrams, photographs. (G22, Al)

316-G. Semiautomatic Line Speeds Aluminum Tank Production. John Sloan. *Iron Age*, v. 176, Nov. 3, 1955, p. 95-97.

Operations include forming, welding and machining. Photographs. (G general, K general, T26, Al)

317-G. Versatile Multiple Slide Equipment. W. G. Patton. *Iron Age*, v. 176, Nov. 3, 1955, p. 98-100.

Forming can be spread over as many as four dies to lengthen die life and simplify maintenance and repair. Photographs. (G1)

318-G. Nylon Rolls Prevent Scratches in Forming Prefinished Strip. K. G. Harms. *Iron Age*, v. 176, Nov. 3, 1955, p. 104-105.

Roll pairs of nylon and steel, set up for progressive contouring, will form prefinished, thin-gage stainless, brass and aluminum. Photographs, diagram. (G11, Al, Cu, SS, ST)

319-G. Scientific Points of Comparison Between the Various Methods of Bending Sheet Metal. Otto Kienzle. *Microtecnic (English Ed.)*, v. 9, no. 4, 1955, p. 177-184.

Considers work pieces which have to support external forces in addition to internal residual stresses after being bent over straight edges. Diagrams, graphs, photographs. (G6)

320-G. Sound Drilling Practice. E. Van Emden. *Microtecnic (English Ed.)* v. 9, no. 4, 1955, p. 185-198.

Investigation of dimensions and other physical properties and their relationship to cutting ability; study of proper speeds and feeds, grinding methods, coolant applications, general workshop conditions. Photographs, tables, diagram. (G17)

321-G. Unique Spar-Cap Milling, Bending, Contouring at Douglas. C. F. Wallace. *Western Metals*, v. 10, Oct. 1955, p. 49-51.

Operation also involves a unique chip disposal method, heat treatment for age hardening, sandblasting. Photographs. (G17, G6)

322-G. (French.) Superfinishing With the Cutting Tool. Jean-Jacques Desherault. *Revue de l'aluminium*, v. 32, no. 223, July-Aug. 1955, p. 701-712.

Obtained by direct machining with a tungsten carbide cutting tool a surface state of a very high standard, three times better than by superfinishing techniques, six times better than with diamond finishing, is shown by a Brush surface analyzer. Graphs, diagrams, tables, photographs. (G17, EG-a)

323-G. (Book.) The New American Machinist's Handbook. Rupert le Grand, editor. Sections individually paged. 1955. McGraw-Hill Book Co., 330 W. 42nd St., New York 36, N. Y.

A comprehensive and up-to-date guide to machining, metal-forming, and assembly methods; materials; metal finishing; inspection; fastening devices; tool engineering and drafting practice; machine-tool standards; and power transmission equipment. (G general, K general, L general, S general)

H Powder Metallurgy

188-H. Rolled Metal Powder Sheet. Lincoln T. Work, John D. Shaw and Walter V. Knopp. *Metal Progress*, v. 68, Oct. 1955, p. 115-116.

Good quality copper strip is being produced from roll-bonded copper powder. The powder is obtained by leaching low-grade copper-bearing scrap which cannot be remelted into ingot of good quality. Micrograph, tables. (H10, H14, Cu)

189-H. How Dimensions and Properties Are Affected by Adding Copper to Iron Powder Compacts. I. P. Ulf Gummeson and Lennart Forss. *Precision Metal Molding*, v. 13, Oct. 1955, p. 55-57, 92.

Report on changes in dimensions and physical properties. Graphs. (To be continued.) (H12, Cu, Fe)

190-H. (German.) A Note on Sintering Zinc Powder. Friedrich Erdmann-Jesnitzer and Peter Rack. *Metallurgie*, v. 5, no. 6, June 1955, p. 184-196.

Methods of improving creep behavior considered. Tables, graphs, micrographs, diagram, photographs. 23 ref. (H15, Q3, Zn)

191-H. (Polish.) Powder Metallurgy Research in Czechoslovakia. E. Bryjak. *Hutnik*, v. 22, nos. 7-8, July-Aug. 1955, p. 278-286.

Survey of developments, including sintering techniques, factors affecting sinterability, effect of additions, hardness and other characteristics of tungsten, cobalt and other sinter products. Tables, graphs. 9 ref. (H general, W, Co, Fe, Cu)

192-H. Hot Pressing Improves Powder Metal. *Metal-Working*, v. 11, Nov. 1955, p. 8-9.

Shrinkage allowance and sintering of carbides unnecessary. Photographs. (H14)

193-H. (Spanish.) Present Ideas Concerning the Phenomenon of Sintering. Antonio Garcia Verduch. *Instituto del hierro y del acero*, v. 8, no. 36, Apr.-June 1955, p. 136-148.

Influence of stoichiometric deviations on the rate of sintering, intergranular union, interaction of particles before sintering, pressing and gases occluded in pores. Graphs, diagrams. 22 ref. (H15)

194-H. How Dimensions and Properties Are Affected by Adding Copper to Iron Powder Compacts. II. P. Ulf Gummeson and Lennart Forss. *Precision Metal Molding*, v. 13, Nov. 1955, p. 44-45, 83-84.

Separate consideration of factors causing growth and shrinkage; special interest given where copper is below the solubility limit of copper in iron at sintering temperature, shows that dimensional changes are closely related to the particle characteristics of the powder and duration of the liquid phase. Graphs. 12 ref. (H12, H11, P10, Fe, Cu)

195-H. (Czech.) Effect of Carbon on the Quality of Sintered Carbides of the Tungsten Carbide-Cobalt System. Miroslav Petrdlik and Vladimir Dufek. *Hutnické listy*, v. 10, no. 9, Sept. 1955, p. 528-535.

When testing sinterability with 2.6 and 10% cobalt, the best hardness, specific gravity and bending strength are obtained when carbon content is near the stoichiometric value. Tables, graphs, photographs, micrographs. 8 ref. (H15, H11, C-n, Co)

J Heat Treatment

247-J. Nitriding Improvements. G. Keller. *Brown Boveri Review*, v. 42, No. 3, Mar. 1955, p. 88-93.

Brown Boveri procedures and results. Graphs, micrograph, diagrams, photographs. (J28)

248-J. Design of Special Atmosphere Furnaces and Their Application to Heat-Treatment of Metals. I. Jenk-

ins. *Metal Treatment and Drop Forging*, v. 22, Sept. 1955, p. 369-374.

Design and application of batch furnaces and controlled atmospheres now available in industry. Tables, photographs. (To be continued.) (J2)

249-J. (French.) Contribution to the Study of the Reproductibility of the Jominy Test. A. Kohn and G. Delbart. *Revue de métallurgie*, v. 52, no. 8, Aug. 1955, p. 658-667.

Dispersion was due to inadequate correspondence between values obtained with instruments of varying hardness and to inadequate preparation of bar ends or deficient testpiece fixture. Tables, graphs. (J26, ST)

250-J. (German.) Inductive Heating of Slugs. K. H. Brokmeier. *Aluminium*, v. 31, no. 10, Oct. 1955, p. 471-476.

Concentration of energy, furnace dimensions and design, constancy of temperature, energy consumption, heating up period, prime costs. Diagrams, graphs, table, photographs. (J2, Al)

251-J. (German.) Annealing of Steel Rods in Vacuum. Odo Felgel-Farnholz, Heribert Sidan and Werner H. Schelbe. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben*, v. 100, nos. 7-8, July-Aug. 1955, p. 250-257.

Data of investigation, giving optimum condition for the process. Tables, graphs, photograph. 2 ref. (J23, ST)

252-J. (Polish.) Up-To-Date Installations for the Annealing of Narrow Strips. Zygmunt Wusatowski. *Hutnik*, v. 22, nos. 7-8, 1955, p. 258-265.

Use of bell-type and shaft furnaces; bell-type heated electrically; continuous-process normalization and annealing; induction heating. Diagrams. 15 ref. (J23, ST)

253-J. New Advancements in Hot Salt Quenching. Q. D. Mehrkam. *Industrial Heating*, v. 22, Oct 1955, p. 1980 + 8 pages.

Austempering and martempering in a nitrate-nitrite salt bath with downward flow. Safe water injection described. Graphs, table. (J2)

254-J. Optimum Heat Treatment for Magnetic Core Iron. H. A. Steinherz. *Industrial Heating*, v. 22, Oct. 1955, p. 1992 + 4 pages.

Optimum heat treatment for a particular type of core iron was established using statistical experimental techniques. Application of the results to factory procedure resulted in a 33% improvement in permeability. Tables, photographs. 5 ref. (J general, P16, Fe)

255-J. Gas as a Source of Protective Atmosphere in Industrial Furnaces. E. J. Funk. *Industrial Heating*, v. 22, Oct. 1955, p. 2030 + 4 pages.

Endothermic and exothermic type gases for use as protective furnace atmospheres during various heat treating applications. Graphs. (J2)

256-J. Analyzing Furnace Atmospheres. Franklin B. Leslie. *Metal Treating*, v. 6, Sept.-Oct. 1955, p. 10 + 5 pages.

Applications of analyzer, for quality control and safety, given for measuring atmospheric composition, purified exothermic gas, endothermic gas, dissociated ammonia, nitriding and gas carburizing. Photographs, tables, graphs. (J2, J28, S11)

257-J. Heat Treating Gray Iron. I. *Steel*, v. 137, Oct. 24, 1955, p. 118-120, 122.

Describes stress relief and annealing. Photographs, graphs, table. (J1, J23, CI)

258-J. Flame Hardening—Modern Methods and Equipment. I. John E. Hyler. *Steel Processing*, v. 41, Oct. 1955, p. 659-664, 668, 671.

Advantages, procedures. Photographs. (J2)

259-J. Tempering Chart for Steels Used in Tool Engineering. *Tool Engineer*, v. 35, Nov. 1955, p. 125-126.

Check list of tempering methods and resulting properties of several brands. Tables. (J29, TS, ST)

260-J. Freezing Plus Working Makes Stainless Super-Strong. V. N. Krivobok and C. R. Mayne. *American Machinist*, v. 99, Oct. 24, 1955, p. 152-153.

At subzero temperatures, severe forming and bending are possible and, at the same time, physical properties are improved. Graphs, photographs. (J26, Q23, SS)

261-J. Heat Treat Controls Boost Job Shop Quality. W. G. Patton. *Iron Age*, v. 176, Oct. 20, 1955, p. 103-106.

System used by Bosworth Steel Treating Co. keeps production and quality at high levels for broad range of work. Photographs, histogram. (J general, S16, ST)

262-J. Heat Treating Gray Iron. II. *Steel*, v. 137, Oct. 31, 1955, p. 76-77, 79.

Reasons for and types of heating, composition and structure, quenching and after treatment. Photograph, table, micrographs. (J general, CI)

263-J. Progressive Work-Hardening and Re-Annealing of Five Brands of High Conductivity Copper. M. V. Yokelson and M. Balicki. *Wire and Wire Products*, v. 30, Oct. 1955, p. 1179, 1182-1194, 1285.

Includes photographs, tables, graphs. 4 ref. (J23, Cu)

264-J. (Czech.) Secondary Hardening of Low-Alloyed Boiler Steels. Frantisek Kralik. *Hutnické listy*, v. 10, no. 9, Sept. 1955, p. 525-528.

Clarifies reasoning for secondary hardening of chromium-molybdenum, chromium-vanadium and chromium-molybdenum-vanadium steels. Two mechanisms of vanadium carbide precipitation, regarding the creep strength of chromium-vanadium steels, described; functions of vanadium in boiler steels. Graphs. (J29, J27, Q3, AY)

265-J. (French.) Stabilizing Heat Treatments of Aluminum-5% Magnesium Alloys Against the Effects of Low-Temperature Heating. I. André Guilhaudis. *Revue de l'aluminium*, v. 32, no. 223, July-Aug. 1955, p. 717-725.

Alloys of the aluminum-magnesium group, even with a magnesium content of 5%, can be sensitized to intercrystalline corrosion by heating them at low temperatures between 70 and 200° C. despite having the highest resistance to corrosion of the light alloys. Stabilizing heat treatments reviewed. Micrographs, graphs, photograph, tables, diagrams. (To be continued.) (J general, R2, Al)

266-J. (German.) Investigations on the Effect of Abrupt Temperature Changes on the Surface Finish of Steel. Wilhelm Rädeker. *Stahl und Eisen*, v. 75, no. 19, Sept. 22, 1955, p. 1252-1263.

Tests from 300 to 1000° C. with up to 250 quenches on round specimens and tubes of basic converter steel and steel used for piercing mandrels. Tables, graphs, diagrams, photographs, micrographs. 5 ref. (J26, ST)

267-J. (Italian.) Influence of Heat Treatments on Some Mattes of the Copper-Nickel-Sulfur System. V. Gottardi. *Metallurgia italiana*, v. 47, no. 9, Sept. 1955, p. 415-420.

Thermal growth of various phases, particularly liquid, has been studied with regard to temperature, time and composition. Diagram, tables, micrographs. 13 ref. (J general, Cu, Ni)

268-J. (Book.) Industrial Furnaces. W. Trinks. v. II. 3rd Ed. 358 p. 1955. John Wiley & Sons, New York, N. Y. $10.00

Fuels and electric energy; combustion devices and heating elements; control of furnace temperature and atmosphere; labor-saving appliances; furnace types; safety measures. (J general)

Joining

466-K. Joining of Metals. J. P. Moore. *Metal Industry*, v. 87, Sept. 30, 1955, p. 277-281.

Interfacial phenomena, structural changes, corrosion of joints. Diagrams, table. 4 ref. (K general)

467-K. Choose the Right Arc Welding Electrodes. L. K. Stringham. *Steel*, v. 137, Oct. 10, 1955, p. 138-141.

Characteristics of various electrodes; recommended uses. Diagrams, table. (K1)

468-K. Maintenance of Resistance Welding Equipment. I. Jones. *Welding and Metal Fabrication*, v. 23, Oct. 1955, p. 403-405.

Fault location and correction. Diagram, photograph, graph. (K3)

469-K. Basic Shear Strength Properties of Metal-Bonding Adhesives as Determined by Lap-Joint Stress Formulas of Volkersen and Goland and Reissner. H. W. Eickner. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1850, Aug. 1955, 36 p.

Strength tests made of lap-joint specimens of clad T5S-T6 aluminum alloys with various lengths of overlap and various sheet-metal thicknesses. Bonds were made with four adhesives. Graphs, photographs, tables. 10 ref. (K12, Q2, Al)

470-K. (German.) "Thermit"-Trolley Car Rail Welding Process. Franz Novotny. *Schweisstechnik*, v. 9, no. 7, July 1955, p. 77-81.

Working process of rail welding by use of thermit steel in liquid form, with emphasis on its advantages. Diagrams, photographs, micrographs. (K4, ST)

471-K. (Russian.) Some Peculiarities of Welding Cast Austenitic Steels. K. V. Liubavskii and F. I. Pashukanis. *Svarochnoe proizvodstvo*, 1955, no. 9, Sept., p. 1-6.

Intercrystalline cracking, microstructure of multilayer welding, brittleness, grain coarseness, effect of heat treatment on weld strength. Micrographs, tables, diagrams. 6 ref. (K1, K9, Q23, M27, CI)

472-K. (Russian.) Methods of Calculating Injector Oxy-Acetylene Welding Torches. V. D. Nechaev. *Svarochnoe proizvodstvo*, 1955, no. 9, Sept., p. 13-16.

Equations for calculating dimensions of canals, oxygen pressure, and other factors. Diagrams, graphs. (K2)

473-K. (Russian.) Butt Welding of Electrotechnical Silicon Steel Sheets. N. S. Kabanov. *Svarochnoe proizvodstvo*, 1955, no. 9, Sept., p. 23-27.

Welding techniques, shielding gases, mechanical tests, microstructure, defects and their elimination. Graphs, micrographs, tables, photographs. (K1, Q general, M27, SG-p)

474-K. Welding of Nickel and High-Nickel Alloys by Inert-Gas Shielded-Arc Processes. J. Hinde and D. R.

Thorneycroft. *British Welding Journal*, v. 2, Oct. 1955, p. 411-419.

Heat treatment, preparation and cleaning before welding of nickel alloys in general use in Europe. Tables, photographs, graph, micrographs. 4 ref. (K1, Ni)

475-K. Some Electrical Aspects of Inert-Gas Shielded-Arc Welding. L. H. Orton and J. C. Needham. *British Welding Journal*, v. 2, Oct. 1955, p. 419-426.

Requirements for arc, circuit and electrode; examples for tungsten arc and consumable-electrode processes. Graphs, diagrams, photographs. 16 ref. (K1, W)

476-K. Inert-Gas Shielded-Arc Welding in the Gas-Turbine Industry. F. G. C. Sandiford, R. T. Weatherstone, J. E. Hooper, K. H. McDowell and L. Camidge. *British Welding Journal*, v. 2, Oct. 1955, p. 443-455.

Reviews shortcomings of materials, tooling, technique and equipment; indicates trend over next few years. Photographs, radiographs, micrographs, diagrams. 8 ref. (K1)

477-K. Some Factors Affecting Design of Aluminium-Alloy Fabrications Welded by the Inert-Gas Shielded-Arc Process. A. L. Hale. *British Welding Journal*, v. 2, Oct. 1955, p. 455-458.

Increasing use of aluminum and its alloys in general constructional engineering has caused need for this information. Diagrams. 2 ref. (K1, T26, Al)

478-K. Testing and Inspection of Welds in Aluminium and Aluminium-Alloy Plate Made by the Inert-Gas-Shielded Welding Processes. P. Bradley. *British Welding Journal*, v. 2, Oct. 1955, p. 459-463.

Frequency of defects in vessels, effectiveness of localized repairs. Photographs, micrograph, radiographs. (K1, K9, Al)

479-K. Inert-Gas Shielded Tungsten Arc Welding. J. R. Baker and J. W. Ross. *Canadian Metals*, v. 18, Oct. 1955, p. 52 + 5 pages.

Principles and methods, sources of weld contamination, welding of titanium, and carbon or stainless steel. Photographs. (K1, Ti, CN, SS)

480-K. Induction Soldering of Waveguide Flanges. A. R. Fairchild. *Industrial Heating*, v. 22, Oct. 1955, p. 2002, 2004, 2006.

Tin-soldered brass flanges avoid section distortion that brazing aggravates. Photograph, graphs. (K7, Cu, Sn)

481-K. Induction Brazing. II. D. Warburton Brown. *Machinery Lloyd (Overseas Ed.)*, v. 27, Oct. 8, 1955, p. 81-84.

Capillary action, design and strength of joints, protective atmospheres. Diagrams. (K8)

482-K. Connecting Aluminum Conductors by the Koldweld Process. W. A. Barnes. *Modern Metals*, v. 11, Oct. 1955, p. 62, 64, 66-67.

Weld characteristics, types of pressure welds, butt-welding wire, bimetal connectors, test results, cold-welding tools. Photographs. (K5, Al)

483-K. Hidden-Arc Welding Speeds Production. Charles. N. Aronson. *Tool Engineer*, v. 35, Nov. 1955, p. 95-97.

Use justified because of large amounts of welding involved in fabrication of positioners. Photographs. (K1)

484-K. Soldered Connections in Electrical Circuits. A. Z. Mample. *Western Union Technical Review*, v. 9, Oct. 1955, p. 125-136.

Explanations intended to prevent troubles and save money. Graphs, tables. (K7)

485-K. (French.) The Welding of Aluminum in Inert Atmosphere. Maurice Michaud. Paper from "Congres International de l'Aluminium". v. II. La société d'Edition et de Documentation des Alliages Légers, p. 157; disc., p. 158.

With this process, either a consumable or nonconsumable electrode may be used. (K1, Al)

486-K. (French.) Recent Progress in Electric Resistance Welding of Light Alloys. Georges Moressee. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 159-175; disc., p. 175.

Needed for the air, rail and road transport industries, seam-welded light alloys must not be affected by external factors and should have a thickness of 1/10 to 10 mm. Photographs, diagrams, oscillogram, tables. (K3, EG-a)

487-K. (Russian.) Flux-Shielded Metal Arc Welding of Steel 16 GNM. I. L. Brinberg and L. V. Golub. *Svarochnoe proizvodstvo*, 1955, no. 9, Sept., p. 18-21.

Fluxes and welding techniques; microstructure, yield point, yield strength, other mechanical indices of welded specimens, effect of heat treatment. Micrographs, graphs, tables, diagram. 2 ref. (K1, Q23, M27, ST)

488-K. Welding of Copper and Copper Alloys. D. C. Moore and E. A. Taylor. *British Welding Journal*, v. 2, Oct. 1955, p. 427-442.

Conditions for optimum metal transfer in argon; use of nitrogen shielding examined for welding copper. Joint quality assessed by radiographic and metallographic examination and by mechanical tests. Tables, micrographs, radiographs, graph, photographs. 6 ref. (K1, Cu)

489-K. Techniques for Welding and Brazing Molybdenum. *Industry & Welding*, v. 28, Nov. 1955, p. 54-56, 59, 89.

Preferred and poor methods of welding molybdenum to itself and metals or alloys with which it readily alloys. Photographs. (K general, Mo)

490-K. New Method Solves Problems in Chrome Moly Welding. Lloyd C. Nesbitt. *Industry & Welding*, v. 28, Nov. 1955, p. 80-82, 85-87.

Produces consistently sound welds of high ductility; reduced heating requirements save time and money. Photographs. (K1, Q23, AY)

491-K. (German.) Development and Standardization of Welding Tests. Kurt Kautz. *Schweissen und Schneiden*, v. 7, no. 9, Sept. 1955, p. 274-375.

Recent work and economic value of tests. 6 ref. (K9)

492-K. (German.) Tear Tests for Welds. J. Colbus. *Schweissen und Schneiden*, v. 7, no. 9, Sept. 1955, p. 376-383.

Both tear tests with fusion-welded butt joints and notch tear test are used according to German standards. Tables, diagrams, graphs. 3 ref. (K9)

493-K. (German.) The Determination of Weldability of Light Flat Steels. F. Eisenkolb. *Schweissen und Schneiden*, v. 7, no. 9, Sept. 1955, p. 404-407.

Tests for behavior under welding conditions and for plasticity of weld seam; investigation of crack sensitivity. Photographs. 17 ref. (K9, ST)

494-K. (German.) Automatic Welding for Section Construction of an Inland Navigating Boat. Janos Kenderesi. *Schweisstechnik*, v. 9, no. 8, Aug. 1955, p. 89-92.

Details for section welding of ship. Diagrams, graphs. (To be continued.) (K1, ST)

495-K. (Russian.) Temperature of Molten Electrode Metal Drops During Arc Welding. A. A. Erokhin. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk*, 1955, no. 9, Sept. p. 125-136.

Comparison of electrodes with and without flux or coverings, effect of electrode composition and welding conditions, calorimetric measurements. Tables, diagrams. 19 ref. (K1)

496-K. (Russian.) Macro-Nonhomogeneity in the Chemical Composition of Weld Seam Metal. G. L. Petrov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk*, 1955, no. 9, Sept., p. 137-153.

Distribution of carbon, chemical composition change in seam around the line of fusion with base metal, chemical nonhomogeneity in multilayer seams, effect of vanadium and nickel. Diagrams, graphs, micrographs, photograph, tables. 7 ref. (K1, CI, AY)

497-K. (Russian.) New Machinery Set-Up for Producing Welded Pipe With Spiral Seam. A. I. Tselikov and A. A. Sarychev. *Stal'*, v. 15, no. 9, Sept. 1955, p. 815-820.

Characteristics of machinery used, cutting, feeding and submerged arc welding, mechanical properties of pipes. Photographs, tables. (K1, Q general, ST)

498-K. (Spanish.) Appraisal of Welding Transformers. J. Callejo. *Ciencia y técnica de la soldadura*, v. 5, no. 25, July-Aug. 1955, 6 p.

Study of characteristics necessary for a transformer to be used in electric arc welding. Graphs. (K1)

499-K. (Spanish.) Investigation of the Fatigue Strength of the Butt Welded Joints of a Weldable "Lloyd"-Type Spanish Steel. Z. Garcia Martin. *Ciencia y técnica de la soldadura*, v. 5, no. 25, July-Aug. 1955, 16 p.

Study of fatigue strength, low dynamic bending and tension forces of the base metal; effect of the butt-welded joint and extra thickness of the welding head on this strength. Tables, photographs, graphs. 7 ref. (K9, Q7, Q27, ST)

500-K. (Spanish.) What Is Welding? A. Vollmaier. *Ciencia y técnica de la soldadura*, v. 5, no. 25, July-Aug. 1955, 14 p.

Discusses transformers and converters for welding with alternating current and various special welding processes; compares use of different electrodes with alternating and direct current. Diagrams, photographs. (To be continued.) (K1)

501-K. (Book-German.) Joining and Fastening Elements for Instruments. Hermann Pöschl. 108 p. 1954. Springer-Verlag, Berlin, Germany.

Methods and means of connecting and joining different parts in small precision equipment. (K13)

L

Cleaning, Coating and Finishing

711-L. How Far Will Your Paint Go? E. Gustave Shur. *Interchemical Review* v. 14, Autumn 1955, p. 79-85.

Determination of amount of paint needed to cover a given area. Considers losses and pigment-to-vehicle ratios. Tables, diagrams, photograph. (L26)

712-L. New Chrome Plating Process Deposits Highly Ductile Coatings.

P. J. Topelian. *Iron Age*, v. 176, Oct. 13, 1955, p. 99-101.

Heavy, dense hard-chromium deposits can be plated directly on aluminum by a new process which gives exceptional intermetallic bonding strength. Deposits can also be applied to carbide, titanium, cold rolled steel, zinc alloys, lead alloys, beryllium-copper and tungsten. Photographs. (L17, Q23, Cr)

713-L. Recent Anodizing Research. A. W. Brace. *Metal Industry*, v. 87, Sept. 23, 1955, p. 261-264.

Recent work on mechanism of coating formation and effects of various anodizing conditions. Graphs, table, micrographs, diagram. 7 ref. (L19, Al)

714-L. Electroplated Contacts. P. Quinn. *Metallurgia*, v. 52, no. 311, Sept. 1955, p. 115-120.

How best use can be made of an electroplating process to achieve the maximum efficiency in production and effectiveness in service. Tables. 6 ref. (L17, Cu, EG-c)

715-L. Protecting Molybdenum From Oxidation. Alvin J. Herzig and James R. Blanchard. *Metal Progress*, v. 68, Oct. 1955, p. 109-114.

Cladding, electroplating, metal spraying and ceramic coating offer promise for protecting molybdenum under various conditions and services. Photographs, tables. (L17, L23, L24, L27, Mo)

716-L. Airless Spray Painting. James A. Bede. *Plating*, v. 42, Oct. 1955, p. 1251-1254.

Requires heating paint and spraying it under pressure through suitable nozzle. Graphs, diagram. (L26)

717-L. Electrophoretic Deposition of Metallic and Composite Coatings. J. J. Shyne, H. N. Barr, W. D. Fletcher and H. G. Scheible. *Plating*, v. 42, Oct. 1955, p. 1255-1258.

Development of process for applying nickel, nickel-chromium, nickel-chromium-iron, copper-molybdenum disulfide, and nickel-silicon carbide to base metals. Techniques for bonding the coatings include deposition of a hydrogen reducible oxide, or electrolytic deposition of a metal through pores in the coating. Photographs, graph. 7 ref. (L17, Si, Cu, Mo, Fe, Cr, Ni)

718-L. Electroless Nickel Plating of Nonconductors. Philip H. Eisenberg and Harold C. Schneider. *Plating*, v. 42, Oct. 1955, p. 1268-1270.

Application to nonconductors of varied geometry; cleaning and etching cycles; plating solutions; plate adherence, deposition rates and solution control data; microscopic examination of plated objects. Photographs, graph. 5 ref. (L14, Ni)

719-L. Strippable Stop-Off Coatings. Myron C. Bryant. *Plating*, v. 42, Oct. 1955, p. 1273-1274.

Limitations of an improved technique for selective masking of metal surfaces prior to electroplating operations. Photographs. (L26, L17)

720-L. How to Strip Plated Die Castings. W. K. Murray. *Precision Metal Molding*, v. 13, Oct. 1955, p. 67-68, 82.

Practical method cuts down rejects by salvaging castings that have defective plating. Photograph. 2 ref. (L12, Pb, Cr, Ni, Cu, Zn)

721-L. Shiny Picture for Brass-Plated Strip. E. J. Roehl. *Steel*, v. 137, Oct. 17, 1955, p. 118-119.

Equipment and methods for plating steel strip. Embossed patterns and other finishes. Applications. Photographs, graph. (L17, Cu)

722-L. (German.) **"All-Purpose" Polishing Paste.** W. Burkart and G. Herbst. *Metalloberfläche*, Ausgabe B, v. 9, no. 9, Sept. 1955, p. 129-132.

Evaluates various alumina and alumina-base polishes; distinctive characteristics; possibilities. Micrographs, photograph. 1 ref. (L10, M21)

723-L. (German.) **Influence of Polishes on Corrosion Susceptibility of Metal Surfaces.** R. Weiner and G. Klein. *Metalloberfläche*, Ausgabe B, v. 9, no. 9, Sept. 1955, p. 132-134.

Data, compiled in tables, of different polishes and metals with respect to their influence on corrosion of the treated metal. Tables. (L10, R11)

724-L. (German.) **Properties of Mechanically Treated Metal Surfaces.** Rolf Krause. *Metalloberfläche*, Ausgabe A, v. 9, no. 9, Sept. 1955, p. 135-140.

Structure of a mechanically treated surface; running-in process of amorphous and crystalline surface sheaths. Micrographs, diagram. 7 ref. (L10, M26, M27)

725-L. (German.) **Influence of Hardness and Melting Point on the Finishing of Metals.** A. Wisken and H. Raether. *Metalloberfläche*, Ausgabe A, v. 9, no. 9, Sept. 1955, p. 140-143.

Treats role of hardness and temperature in polishing of metal surface. Experimental data. Diagram, graphs, micrographs. 5 ref. (L10, Q29)

726-L. Silver Plating Aluminum Bus Bars. Julius Toth and H. E. Ricks. *Metal Finishing*, v. 53, Oct. 1955, p. 44-46.

Critical point is establishing silver film on the oxide-free base metal. Complete process described. Photographs, graph, diagram. (L17, Ag, Al)

727-L. Copper-Tin-Zinc Plating. J. B. Mohler. *Metal Finishing*, v. 53, Oct. 1955, p. 47-51.

Various plating alloys, their properties and applications. Industrial plating conditions. Table, photographs. 16 ref. (L17, Cu, Sn, Zn)

728-L. Surface Treatment and Finishing of Light Metals. pt. 2, VII. Industrial Anodizing of Aluminum and Its Alloys. S. Wernick and R. Pinner. *Metal Finishing*, v. 53, Oct. 1955, p. 52-56, 60.

Interrelation of operating details, thickness and qualities of the coat, effects of impurities, chromic acid processes. Tables, graphs, photographs. (To be continued.) (L19, Al)

729-L. Electroless Plating in Production. Thomas A. Dickinson. *Metal Treating*, v. 6, Sept.-Oct. 1955, p. 22, 24, 26-27.

Process makes it possible to prevent corrosion, reclaim over-machined parts, improve abrasion resistance and obtain decorative finish effects where electroplating is impractical. Photographs. table. (L14, Ni)

730-L. Anodized Insulation. *Modern Metals*, v. 11, Oct. 1955, p. 78.

Uses and advantages of an aluminum oxide in the winding of electromagnetic coils for transformers, solenoids and some motors and generators. Photographs. (L19, Al)

731-L. Organic Coatings for Electroplaters. Wayne R. Fuller. *Plating*, v. 42, Oct. 1955, p. 1271-1272.

Types of clear and colored transparent product finishes most suitable for different conditions of service and for use on chrome plate, solid brass, brass plate and aluminum. (L26, Al, Cu, Cr)

732-L. Chromium Plating Rocket Motors at Ryan. Bernard W. Floersch. *Steel Processing*, v. 41, Oct. 1955, p. 657-658.

Used to protect base material from heat of thrust. Photographs. (L17, Cr)

733-L. (English.) **Operating M.B.V. as a Continuous Process.** Y. C. Cheng, Y. Y. Li and Y. Chu. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 73-77.

Continuous service of this well-known surface finishing method for aluminum obtained by regularly introducing corrective additions of sodium dichromate and sodium carbonate solutions. Tables, graph. 4 ref. (L14, Al)

734-L. (French.) **Growth of Alumina Films on Super-Purity Aluminum-Alloy Single Crystals Containing 3% Magnesium.** Jean Herenguel and Pierre LeLong. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 63-66 + 1 plate.

Confirms differences in anodizing rate according to crystal orientation. Micrographs, photographs, diagrams, graphs. 6 ref. (L19, Al)

735-L. (French.) **The Formation of Oxide Layers Observed on Aluminum Immersed in Nitric Acid.** Jos Patrie. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 67-72.

Behavior of electrically insulated and noninsulated aluminum in various concentrations of nitric acid. Graphs, diagrams. 5 ref. (L14, Al)

736-L. (Polish.) **Diffusion Coatings on Ductile Cast Iron.** Waclaw Sakwa. *Wiadomosci hutnicze*, v. 11, no. 9, Sept. 1955, p. 266-269.

Chemical compositions of chromite mixtures; temperature, time, other conditions for chromium diffusion coating. Graph, table. 6 ref. (L15, Cr, CI)

737-L. The Painting of Ships. T. A. Banfield. *Corrosion Technology*, v. 2, Oct. 1955, p. 302-306, 316.

Problems from viewpoint of paint manufacturer. Photographs. 12 ref. (L26, ST)

738-L. Bright Nickel Plating Solutions. T. E. Such. *Electroplating and Metal Finishing*, v. 8, Oct. 1955, p. 347-350.

Special features required for the characteristics of plating, including sensitivity to cleanliness of base metal, throwing power of solution, use of wetting agents, treatment of passive deposits before chromium plating, production control tests. Photographs, diagram. 10 ref. (L17, Ni)

739-L. Electric Radiant Heating for Paint Drying and Stoving Processes. F. Hunt. *Electroplating and Metal Finishing*, v. 8, Oct. 1955, p. 343-346, 366.

Established because it is suited to mass production methods and fits easily into mechanical sequence. Graph, photographs. (L26)

740-L. Mould Spraying. H. J. Plaster. *Electroplating and Metal Finishing*, v. 8, Oct. 1955, p. 354-358.

Properties of sprayed metal coatings in relation to the requirements of die materials; method of making dies by metal spraying on to a master pattern. Tables, photographs, diagrams. 5 ref. (L23, Sn, Cr, ST)

741-L. Finishing Before Fabrication. *Finish*, v. 12, Nov. 1955, p. 35-38, 50.

Continuous cleaning and phosphatizing, infra-red drying and baking, continuous spraying, roller coating and offset printing are used. (L general, Al)

742-L. A.I.D. Testing and Application of Aircraft Finishes. S. G. Anderson. *Industrial Finishing (London)*, v. 9, Sept. 1955, p. 80-82.

Types of paint used and tests for bend, toughness, scratch, natural weathering, resistance to organic solvents, sea water, wet scratch and cold check. Photographs. (L26, Al)

743-L. Lacquer, Synthetic Enamel Coatings and Stoving Finishes. A. A. B. Harvey. *Industrial Finishing (London)*, v. 9, Sept. 1955, p. 84, 86, 88.

Principles governing selection of a finish for specific purposes. Photograph. (To be continued.) (L26, L27)

744-L. Flame Plating Clads for Better Wear Resistance. *Iron Age*, v. 176, Oct. 27, 1955, p. 88-89.

Principle of flame plating based on the ignition of oxygen and acetylene, producing heat and pressure waves. Detonation occurs when heat waves move faster than pressure waves, but when pressure block created by heat is broken, carbide powder is hurled at workpiece surface at supersonic speed. Photograph. (L24, C-n)

745-L. A Critical Comparison of Aluminum Coating Methods. G. T. Sink. *Light Metal Age*, v. 13, Oct. 1955, p. 20-23, 35.

Discusses and compares seven systems—two Iridite, two Alodine, chromic acid and sulfuric acid anodizing, and hard oxide coating. Photographs, graph, tables. (L19, L14, Al)

746-L. Improvement in Electroplating Due to Ultrasonics. Stanley R. Rich. *Plating*, v. 42, Nov. 1955, p. 1407-1411.

Low-frequency vibrations at 20 kc. per sec. eliminate anode polarization, permit plating at accelerated rates, minimize edge build-up and produce uniform, well-bonded coatings. Graphs, photographs. (L17)

747-L. Some Aspects of Solution Level Control. John W. Holland, Loren D. Stevens and Nello R. Arterburn. *Plating*, v. 42, Nov. 1955, p. 1412-1415.

Economy in plating, avoiding stream pollution and keeping rejects low are obtained by various methods. Diagrams. (L17, S18)

748-L. The Treatment of Certain Plating Solutions by Ion Exchange. Edward B. Tooper. *Plating*, v. 42, Nov. 1955, p. 1416-1420.

Proper use of resin can purify solutions and recover chemicals such as chromic acid. Graphs, photograph. 4 ref. (L17, A8)

749-L. The Effect of Mica on the Embrittlement of Anti-Corrosive Primers for Steel. H. W. Chatfield. *Product Finishing*, v. 8, Oct. 1955, p. 50-56.

Aging embrittlement can be reduced by adding water-ground mica without affecting anticorrosive properties. Tables, micrographs. (L26, Q23, ST)

750-L. Diffusion Coating With Metallic Halides. II. I. Jenkins. *Product Finishing*, v. 8, Oct. 1955, p. 61-66, 68.

Halide and carbonyl processes and physical characteristics, properties and applications of diffusion coatings. Photograph, diagram, graphs, micrographs. (L15)

751-L. Mechanism of Blister Formation in Cast Iron Vitreous Enamels. E. R. Evans. *Product Finishing*, v. 8, Oct. 1955, p. 67-78.

Examination of defective enameled castings, experiments to prove or disprove beliefs, study of gas evolution characteristics of light casting irons. Diagrams, micrographs. photograph, graphs. (L27, CI)

752-L. Some Basic Principles of Continuous Electroplating of Wire. A. B. Ashton. *Wire and Wire Products*, v. 30, Oct. 1955, p. 1163-1166, 1293.

Lineal speed, immersed length, starting and finishing diameters, current density. Tables. (L17)

753-L. Solution Coating of Copper Wire. C. A. Litzler. *Wire and Wire Products*, v. 30, Oct. 1955, p. 1198 + 9 pages.

Design and engineering considerations for precision applications of electrical enameling solutions. Photographs, diagrams. (L27, Cu)

754-L. Tin-Zinc Alloy Plating; Its Application to Copper Wire. Frederick A. Lowenheim and Robert T. Gore. *Wire and Wire Products*, v. 30, Oct. 1955, p. 1219-1221, 1295-1297.

Process is established and adaptable to any set-up designed for alkaline tin plating. Photographs. 3 ref. (L17, Zn, Sn, Cu)

755-L. (German.) Action of Iron-Saturated Zinc Melts on Sulfur and Phosphorus-Containing Iron. Dietrich Horstmann. *Archiv für das Eisenhüttenwessen*, v. 26, no. 10, Oct. 1955, p. 577-581.

Determination of iron losses. Formation of crystal structure and growth of iron-zinc alloy layer. Tables, graphs, micrographs. 6 ref. (L16, M26, Fe, Zn)

756-L. (German.) Precious-Metal Plating for the Electrical Industry. W. Rienäcker. *Metall*, v. 9, nos. 19-20, Oct. 1955, p. 887-888.

Plating of silver, gold, platinum and their alloys on copper, nickel, steel and tin, with a ratio 1:2 and even 1:1 between the precious metal and the base. Photographs. (L17, Sn, ST, Ni, Cu, EG-c)

M

Metallography, Constitution and Primary Structures

354-M. A Precision X-Ray Powder Camera. *American Mineralogist*, v. 40, Sept.-Oct. 1955, p. 876-884.

In cylindrical camera, sample is successively photographed on peripheral positions at opposite ends of a diameter while film remains unmoved. Diagrams, photographs, tables. (M22)

355-M. Precision Determination of Lattice Constants With a Geiger-Counter X-Ray Diffractometer. A. Smakula and J. Kalnajs. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1737-1743.

Diagrams, graphs, tables. 28 ref. (M22)

356-M. Energy Levels of a Crystal Modified by Alloying or by Pressure. R. H. Parmenter. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1759-1766.

Perturbation method of calculating energy levels. 10 ref. (M26, P12)

357-M. Uniform Strains and Deformation Potentials. R. H. Parmenter. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1767-1776.

Perturbation method of calculating the energy levels of a crystal modified by an arbitrary uniform strain. 6 ref. (M26, Q24, P12)

358-M. X-Ray Scattering Effects Due to Localized Static Lattice Defects. Charles W. Tucker, Jr., and Peter Senio. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1777-1781.

Experimental verification of theoretical calculations which show that elastic singularities in a crystalline lattice should produce four specific X-ray scattering effects which include diffuse scattering and an artificial temperature factor. Laue patterns. 16 ref. (M22, M26)

359-M. Computation of Mean Debye Temperature of Cubic Crystals From Elastic Constants. II. Paul M. Sutton. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1826-1830.

Derivation of equations, analysis of accuracy of calculations. Table, graphs. 13 ref. (M26, Q21)

360-M. (French.) Formation and Advantages of Oriented Structures Obtained by Sublimation on Magnesium. L. Grall. *Revue de métallurgie*, v. 52, no. 8, Aug. 1955, p. 603-610; disc., p. 610-611.

New method for producing "sublimation figures" by heating metal between 550 and 650° C. for short periods in high-purity argon. Micrographs. 7 ref. (M23, Mg)

361-M. (German.) Electron Microscope and the Polished Metal Surface. E. Brüche and H. Poppa. *Metalloberfläche*, Ausgabe A, v. 9, no. 9, Sept. 1955, p. 129-135.

Process of electron microscopy with special regard to its application on metal surfaces polished by different methods. Diagrams, micrographs, photographs. 7 ref. (M21, L10, L12, L13)

362-M. (German.) Explanation of the Fracture of Metallic Materials by the Use of New Microscopic Testing Methods. Zdenek Kaderavek. *Metallurgie*, v. 5, no. 7, July 1955, p. 218-226.

Fractographic studies. Micrographs, graphs. 15 ref. (M23)

363-M. (Russian.) Effect of Mechanism of Casting Formation on Cast Iron Structure. V. M. Pishchev. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk*, 1955, no. 8, Aug., p. 107-118.

Size, form and distribution of graphite; microstructure of the basic metallic mass; factors affecting rate of crystallization; effect of thickness and length of casting; effect of techniques, such as centrifugal casting. Micrographs, photographs. 8 ref. (M27, N12, CI)

364-M. A Microscopical Examination of Samples of Iron Containing Titanium-Bearing Inclusions. F. B. Pickering. *Iron and Steel Institute, Journal*, v. 181, Oct. 1955, p. 147-149 + 2 plates.

Establishes means of identification by determination of optical and chemical characteristics of inclusion. Micrographs, table. 4 ref. (M21, Fe, Ti)

365-M. The Metallographic View. XV. Structures and Quenching Rates. H. E. Boyer. *Steel Processing*, v. 41, Oct. 1955, p. 642, 671.

Chart shows results of standard end quench using plain carbon steel. Micrographs, graph. (M27, J26, CN)

366-M. Types of Dislocation Source. B. A. Bilby. Paper from "Defects in Crystalline Solids". The Physical Society, p. 124-133.

Considers low-stress and spontaneous dislocations involving the Frank-Read source and cone source in the face-centered cubic lattice. Diagrams. 19 ref. (M26)

367-M. Crystal Growth and Lattice Defects. W. Dekeyser. Paper from "Defects in Crystalline Solids." The Physical Society, p. 134-142 + 4 plates.

Reviews work on crystal growth and defects at the University of Ghent. Covers growth following the Frank mechanisms and polytypism, growth producing spiral pits, dissolution and etching and growth of

silver chloride on sodium chloride and its relation with epitaxy. Diagram, micrographs. 42 ref. (M26, N12)

368-M. The Electrical Effects of Dislocations in Germanium. W. T. Read, Jr., and G. L. Pearson. Paper from "Defects in Crystalline Solids". The Physical Society, p. 143-152.

Current theoretical developments and pronounced electrical response to germanium crystal disturbances permits many new studies. Graphs, diagrams. 5 ref. (M26, P15, Ge)

369-M. Dislocations in Face-Centered Cubic Lattices. N. Thompson. Paper from "Defects in Crystalline Solids". The Physical Society, p. 153-158.

Considers limitations imposed by geometry of the crystal lattice on the nature and configuration of dislocations in a face-centered cubic lattice. Graph, diagrams. 6 ref. (M26)

370-M. Hexagonal Networks of Dislocations. F. C. Frank. Paper from "Defects in Crystalline Solids". The Physical Society, p. 159-168.

It is shown that there is only a restricted range of possibilities and the simplest and presumably commonest type corresponds to disorientations by rotation about a (111) axis. Diagrams. 7 ref. (M26)

371-M. An Experimental Study of Dislocations in Aluminium-Copper Alloys by Means of Precipitation. H. Wilsdorf and D. Kuhlmann-Wilsdorf. Paper from "Defects in Crystalline Solids". The Physical Society, p. 175-186 + 4 plates; disc., p. 425.

Results of an electron microscopical investigation into preferred precipitation in slip lines and dislocations in aluminum with 1.2 to 4.8% copper. Table, graph, diagrams, micrographs. 20 ref. (M26, N7, Ag, Cu)

372-M. The Influence of Dislocations and Impurities on the Distribution and Size of Etch-Figures on Pure Aluminium. G. Wyon and P. Lacombe. Paper from "Defects in Crystalline Solids". The Physical Society, p. 187-196 + 4 plates.

Concludes that origin of etch-pits on pure aluminum cannot be explained only by dislocations emerging at the surface of crystals, but that associations of dislocations and impurity atoms are necessary for the formation of etch-figures. Table, diagrams, graph, micrographs. 20 ref. (M26, Al)

373-M. Stored Energy and Lattice Defects in Cold-Worked Metals. W. Boas. Paper from "Defects in Crystalline Solids". The Physical Society, p. 212-221; disc., p. 425-426.

Changes in internal energy, electrical resistivity, density and hardness, which occur during the annealing of copper and nickel deformed at room temperature, show that almost all the energy stored in copper is due to dislocations, but that vacancies make a significant contribution to that stored in nickel. Graphs, diagram, X-ray. 11 ref. (M26, Q24, Cu, Ni)

374-M. Radiation Disarrangement of Crystals. J. S. Koehler and F. Seitz. Paper from "Defects in Crystalline Solids". The Physical Society, p. 222-231; disc., p. 426-427.

Possible kinds of imperfections produced by irradiation, amounts of various imperfections produced, annealing processes, both thermal and those resulting from irradiation. Graphs. 25 ref. (M26, P13, J23)

375-M. Recent Experiments at Harwell on Irradiation Effects in Crystalline Solids. R. A. Dugdale. Paper from "Defects in Crystalline Solids". The Physical Society, p. 246-251.

Bombardment effects in boron nitride, platinum, tungsten, molybdenum and the alloy, Cu_3Au, by a variety of radiations. Graphs, diagram. (M26, P10, Au, B, Cu, Mo, Pt, W)

376-M. Stacking Faults in Close-Packed Lattices. A. Seeger. Paper from "Defects in Crystalline Solids". The Physical Society, p. 328-339.

It is concluded that monovalent metals and cobalt should have low stacking fault energies, whereas aluminum, magnesium, zinc, cadmium, nickel, palladium and platinum should have high stacking fault energies. Graphs, diagram. 16 ref. (M26)

377-M. Activation Energy Problems Associated With Extended Dislocations. G. Schoeck and A. Seeger. Paper from "Defects in Crystalline Solids". The Physical Society, p. 340-346.

Outlines and applies an improved method for calculating line energies of dislocations on the basis of Peierls' model to the calculation of the energy of constrictions in extended edge and screw dislocations in aluminum and copper. Diagram, graphs. 13 ref. (M26, P12, Al, Cu)

378-M. Sub-Structures and Networks of Dislocations in Face-Centred Cubic Metals. Taira Suzuki and Toru Imura. Paper from "Defects in Crystalline Solids". The Physical Society, p. 347-358 + 3 plates.

Demonstrates directly some regular arrangements of dislocations, nearly all of which form the predicted three-dimensional structures in face-centered cubic metals, by a delicate technique of chemical etching. Investigates formation of the dislocation networks and effects of alloying elements and of annealing upon them. Diagrams, graphs, micrographs, X-ray diffractograms. 17 ref. (M26)

379-M. The Surface Topography of Diffusion Couples. R. S. Barnes. Paper from "Defects in Crystalline Solids". The Physical Society, p. 359-368 + 4 plates.

Free surfaces of copper-nickel diffusion couples examined microscopically and with X-rays; observed features related to the behavior of the underlying metal. Voids, which form near to the interface in the faster diffusing metal, produce pits in the surface when they are revealed by the evaporation of the metals, which occurs during the anneal. Diagrams, micrographs. 8 ref. (M26, N1, Cu, Ni)

380-M. Lattice Vacancies in the Alkali Metals. D. K. C. MacDonald. Paper from "Defects in Crystalline Solids". The Physical Society, p. 383-390.

Influence of lattice defects (of Schottky, Frenkel-type or perhaps 'crowdions') in several properties of the alkali metals over an appreciable temperature range below the melting point. Specific heat, electric conductivity and thermo-electric power considered. Graphs. 19 ref. (M26, P general, EG-e)

381-M. Jogs in Dislocation Lines. A. Seeger. Paper from "Defects in Crystalline Solids". The Physical Society, p. 391-401.

Study of jogs in various lattices. Concepts of 'intersection jogs' and 'diffusional jogs' introduced; work shows that in lattices based on these two types jogs will, in general, have different energetical and geometrical properties. Tables, diagrams, graph. 18 ref. (M26)

382-M. Small Angle Scattering of X-Rays by Cold-Worked Metal. J. Blin. Paper from "Defects in Crystalline Solids". The Physical Society, p. 420-422.

Pure metal foils of aluminum, copper, nickel and zinc are examined. Specimen extension gives stronger scattering. Tables, graph, diagram. 2 ref. (M26, M22, Al, Cu, Ni, Zn)

383-M. (English.) Pearlite and Bainite Structures in a Eutectoid Carbon Steel. An Electron Microscopic Investigation. Helfrid Modin and Sten Modin. *Jernkontorets annaler,* v. 139, no. 8, 1955, p. 481-512.

Description of structures after isothermal transformation at different temperatures; discussion of formation mechanism. Micrographs. (M27, N8, CN)

384-M. (English.) An Improvement in the Replica Technique for Electron Microscopy of Structures in Steel. Helfrid Modin. *Jernkontorets annaler,* v. 139, no. 8, 1955, p. 521-523.

Carbide particles, broken loose in removing the plastic replica film and obscuring the electron micrograph, can be removed by treatment with dilute acids. Micrographs. (M21, ST)

385-M. (German.) Radiographic and Radiometric Surface Analysis of Light-Metal Alloys. Wolfgang Braun. *Zeitschrift für angewandte Physik,* v. 7, no. 9, Sept. 1955, p. 427-433.

Activation of objects for taking autoradiographic pictures; photoemulsion compositions. Graphs. 13 ref. (M23, EG-a)

386-M. (Spanish.) The "Delta" Constituent in Aluminum Bronze. Justo Ferrer Flotats. *Instituto del hierro y del acero,* v. 8, no. 36, Apr.-June 1955, p. 202-221.

Discusses phase equilibria, outlining experimental work on four specimens of different chemical composition, in which a study was made on the structures obtained in various heat treatments, metallographic identification and morphology of formation of the delta phase. Graphs, tables, micrographs. 16 ref. (M26, N6, Al, Cu)

387-M. Zirconium-Germanium Alloy System. O. N. Carlson, P. E. Armstrong and H. A. Wilhelm. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 40, 1955, 13 p.

Four intermediate phases have been proposed on the basis of microstructures and X-ray data, and peritectic transformation points determined. It is shown that there exists limited solid solubility of germanium in zirconium and negligible solid solubility of zirconium in germanium. Table, graph, micrographs. 8 ref. (M24, Zr, Ge)

388-M. Approximate Phase Relationships in the Titanium-Vanadium-Aluminum System at 1800° F and at 1400° F. Charles B. Jordan and Pol Duwez. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 42, 1955, 16 p.

Temperatures lie respectively above and below the allotropic transformation point of titanium at 1620° F. No new phases were found in the three binary systems. Tables, graphs. 21 ref. (M24, Ti, V, Al)

389-M. Vacancies in Monovalent Metals. F. G. Fumi. *Philosophical Magazine,* v. 46, 7th ser., no. 380, Sept. 1955, p. 1007-1020.

Simplified calculation of energy required to form vacancy in noble and alkali metals. Tables. 31 ref. (M26, P12)

390-M. (French.) Examination With Interferential Contrast of the Fine Microstructure of an Alpha Brass Ruptured Under Alternating Stresses.

Pierre A. Jacquet. *Comptes rendus*, v. 241, no. 13, Sept. 26, 1955, p. 798-800.

Normarski optical device with two polarized waves shows substructure in grains of 37% copper brass. Describes best electrolytic polishing and attack conditions for this type of examination. Micrograph. 3 ref. (M27, M21, Cu)

391-M. (German.) **The Three-Element System Nickel-Chromium-Carbon.** Werner Köster and Sigrid Kabermann. *Archiv für das Eisenhüttenwesen*, v. 26, no. 10, Oct. 1955, p. 627-630.

Microscopic and X-ray investigation for the determination of transformations and phase boundaries. Graphs, micrographs, tables. 6 ref. (M24, Cr, Ni)

392-M. (German.) **The Three-Element System Iron-Phosphorus-Tin.** Rudolf Vogel and Gerhard Zwingmann. *Archiv für das Eisenhüttenwesen*, v. 26, no. 10, Oct. 1955, p. 631-640.

Chemical and metallographic investigation of transformation and space conditions in the system iron-iron phosphide-tin phosphide-tin; the affinity of iron and tin to phosphorus. Diagrams, graphs, tables, micrographs. 7 ref. (M24, N6, Fe, P, Sn)

393-M. (German.) **New Method of Measurement of the Last Debye-Scherrer Lines by a Counter Tube.** Rudolf Berthold and Volkmar Gerold. *Zeitschrift für Metallkunde*, v. 46, no. 9, Sept. 1955, p. 599-601.

Instrument and its functions, exactness of measurement, method of determinating the lattice constants. Diagrams, graphs, tables. (M22)

394-M. (German.) **New Precise X-Ray Apparatus for Fine Structure Investigation, With an Improved Focusing Monochromatic and Precision Focusing Tubes.** Ernst-Günter Hofmann and Heinz Jagodzinski. *Zeitschrift für Metallkunde*, v. 46, no. 9, Sept. 1955, p. 601-610.

Advantages of precision focusing tubes, errors of monocromatic reading, failure of the camera. Diagrams, graphs, photographs, table. 19 ref. (M22)

395-M. (German.) **Micrographical Investigation of Free-cutting Steel.** Hans Neff. *Zeitschrift für Metallkunde*, v. 46, no. 9, Sept. 1955, p. 614-615.

Method of operation and selection of suitable radiation for determination of manganese sulfide in free-cutting steel. Graph, photographs. 3 ref. (M27, S19, ST)

396-M. (German.) **Double Cone Method and Its Suitability for Investigation of Deformation and X-Ray Diffraction Pattern.** Heribert Herglotz. *Zeitschrift für Metallkunde*, v. 46, no. 9, Sept. 1955, p. 620-622.

Method for study of microstructure as applied to recrystallized and milled pure aluminum. Diagrams, photographs. 8 ref. (M22, M27, Al)

397-M. (German.) **Bonding Conditions in Metallic Phases.** Ulrich Dehlinger, Herbert Schenk and Wolfgang Weser. *Zeitschrift für Metallkunde*, v. 46, no. 9, Sept. 1955, p. 647-650.

Bonding in metal phases, as a general case, and unipolar and heteropolar bonding, as a boundary case, of Bloch's method. Gives examples. Diagram. 21 ref. (M26)

398-M. (German.) **New Method of Projecting Crystalline Structure Picture by X-Ray Interferences.** Hugo Seemann. *Zeitschrift für Metallkunde*, v. 46, no. 9, Sept. 1955, p. 722-730.

Beam focusing, spherical geometry of X-ray and electron beam interferences, pinhole camera method. Graphs, diagrams, photographs. 13 ref. (M26, M23)

399-M. (Italian.) **Researches on the Manganese-Nitrogen System.** C. Brisi. *Metallurgia italiana*, v. 47, no. 9, Sept. 1955, p. 405-408.

Particular reference to low-nitrogen zone (up to 6% in weight), because of conflicting data in literature. Graphs, table. 10 ref. (M24, N, Mn)

400-M. (Italian.) **Contribution of Electron Microscopy to the Study of Metal Structures.** G. Bonfiglioli and A. Ferro. *Metallurgia italiana*, v. 47, no. 9, Sept. 1955, p. 409-414.

Evidence of high resolving power which broadens study possibilities. Micrographs. 6 ref. (M21)

401-M. (Book.) **Defects in Crystalline Solids.** 429 p., 27 plates. 1955. The Physical Society, 1 Lowther Gardens, Prince Consort Road, London S. W. 1, England. 40s.

Conference presenting papers on dislocations and point defects, and methods of investigating their properties. (M26)

N

Transformations and Resulting Structures

413-N. Theoretical Aspects of Radiation Damage in Metals. G. J. Dienes. *International Conference on the Peaceful Uses of Atomic Energy*, A/CONF.8/P/750, June 1955, 17 p.

Concerned with displacement of atoms from their normal lattice sites by high energy particle bombardment. Table, graph. 46 ref. (M26)

414-N. Measurements of Diffusion Length in Indium Antimonide. D. G. Avery and D. P. Jenkins. *Journal of Electronics*, v. 1, ser. 1, Sept. 1955, p. 145-151.

Determination of injected carrier lifetimes in polycrystalline and single crystal samples from measurements of the carrier diffusion length. Graphs, table. 10 ref. (N1, In, Sb)

415-N. (French.) **Migration Phenomenon of the Lead-Zinc Eutectic in Cast Zinc.** W. Vinaver and P. Dreulle. *Revue de métallurgie*, v. 52, no. 8, Aug. 1955, p. 612-619; disc., p. 620.

Chemical polishing with chromium reagents causes etched figure lines to appear, corresponding to the intergrain and interdendritic boundaries of solidification. Micrographs, graphs. 4 ref. (N12, Pb, Zn)

416-N. (German.) **Measures for the Prevention of Coarse Carbide Segregations in High Speed Steels.** Karlheinz Werner. *Metallurgie*, v. 5, no 8, Aug. 1955, p. 252-258.

Literature, personal experiments and statistical facts used to arrive at 12 measures. Photograph, graphs, tables, diagram, micrographs. 42 ref. (N12, TS)

417-N. (Hungarian.) **The Crystallization of Graphite in Cast Iron. II.** Istvan Karsay. *Kohaszati lapok*, v. 10, no. 9, Sept. 1955, p. 205-210.

Various hypotheses on the crystallization process; conditions for the formation of spheriodal graphite. Micrographs. 36 ref. (N8, N12, CI, C-a)

418-N. The Alloy Growth Rate of 0.25 Pound Electrolytic Tin Plate in the Temperature Range, 380-440° F. William N. Lambert. *Corrosion*, v. 11, Oct. 1955, p. 454-458.

Samples were immersed from 5 sec. to 30 min. in an oil bath at four temperatures below the melting point of tin and the growth of the tin-iron alloy, for each temperature and initial alloy layer, was plotted. Tables, graphs. 5 ref. (N1, N12, Fe, ST, Sn)

419-N. Metallography of Delta-Ferrite. II. Formation of Delta-Eutectoid in 18-4-1-Type High-Speed Steels. III. Isothermal Transformation of Delta-Ferrite in Low-Carbon 27-5-1-5 Cr-Ni-Mo Corrosion-Resistant Steel. Kehsin Kuo. *Iron and Steel Institute, Journal*, v. 181, Oct. 1955, p. 128-137 + 8 plates.

Overheating, burning, solidification, carbon content and rate of cooling effect on formation of delta-ferrite and its decomposition to austenite and iron-tungsten-carbide. Micrographs, graph. 35 ref. (N8, TS)

420-N. Kinetics of Precipitation in Aluminium-Silver Alloys. G. Borelius. Paper from "Defects in Crystalline Solids". The Physical Society, p. 169-174.

This system is chosen for study because of the high solubility of silver in aluminum, 40 at. % at the eutectic, 558° C. Graphs. 11 ref. (N7, Ag, Al)

421-N. Structure and Anisotropy of Diffusion in Grain Boundaries. R. Smoluchowski. Paper from "Defects in Crystalline Solids". The Physical Society, p. 197-202.

Diffusion of silver in a grain boundary of copper as a function of the angle between the direction of diffusion and the common cubic direction of the grains was studied for various angles of disorientation of the grains. Results indicate a definite anisotropy, the highest rate of diffusion being in the common cubic direction. Graphs. 12 ref. (N1, Ag, Cu)

422-N. Diffusion Short Circuits and Their Role in Precipitation. D. Turnbull. Paper from "Defects in Crystalline Solids." The Physical Society, p. 203-211.

Dislocation channels and elements of incoherent grain boundaries are almost equally effective short circuits for the self-diffusion of silver. The rate of cell growth in cellular precipitation ('discontinuous' precipitation) of tin from lead and of silver from copper is controlled by the rate of diffusion of solute atoms in the cell boundary. Graphs. 29 ref. (N1, N7, Ag, Cu, Pb, Sn)

423-N. Work Hardening in Copper Crystals. T. H. Blewitt, R. R. Coltman and J. K. Redman. Paper from "Defects in Crystalline Solids". The Physical Society, p. 369-382 + 2 plates.

Earlier work shows that the effect of temperature on the work hardening of face-centered cubic metals is much different from that customarily assumed. The objective of this work is to remedy, in small part, this deficiency of experimental data on the low-temperature deformation of single crystals. Table, diagram, graphs, micrographs. 10 ref. (N7, Q24, Cu)

424-N. Transient Heat Conduction in Multiphase Media. J. H. Weiner. *Journal of Applied Physics*, v. 6, Oct. 1955, p. 361-363.

An analytical solution obtained for problem of a semi-infinite mass of material initially at a uniform temperature, the surface of which is maintained at a different constant temperature, where the material may change phase an arbitrary number of times in passing from its initial to its final temperature. Numerical example of application of the solution to the analysis of the solidification of 0.2% carbon steel, comparison between theoretical solution, experimental results and an electrical analogue solution of the same problem. Graphs. 4 ref. (N12, ST)

425-N. Mechanisms of Permeation of Silver, Copper and Mercury Gases of Solid Graphite Walls. Russell K. Edwards and James H. Downing. *Journal of Physical Chemistry*, v. 59, Oct. 1955, p. 1079-1083.

Mercury and silver may pass through walls by mechanism of capillary flow, copper by activated diffusion. Diagram, graphs, table. 14 ref. (N1, Ag, Cu, Hg)

426-N. A Study of the Final Stages of the Austenite to Martensite Transformation in SAE 1050 Steel. Melvin R. Meyerson and Samuel J. Rosenberg. *Journal of Research, National Bureau of Standards*, v. 55, Sept. 1955, p. 177-181.

Curves in temperature range from Ms to −320° F. have been established for two steels. Tables, micrographs, photographs, graphs. 12 ref. (N8, ST)

427-N. Diffusion of Gases Through Metals. II. Diffusion of Hydrogen Through Poisoned Palladium. W. D. Davis. *Knolls Atomic Power Laboratory (U. S. Atomic Energy Commission)*, KAPL-1375, Apr. 1955, 54 p.

Effect of temperature, pressure and prior treatment on permeability. Graphs, diagram. 7 ref. (N1, Pd)

428-N. (German.) **Investigation of Intermediate Stages in Transformation of Manganese Steels.** Winfried Dahl, Werner Jellinghaus, and Eduard Houdremont. *Archiv für das Eisenhüttenwesen*, v. 26, no. 10, Oct. 1955, p. 589-597.

Study of four steels with 0.6 to 1.2% carbon, and 1.9 to 4.1% manganese; influence of temperature; shifting of martensite point; determination of activation energy. Graphs, table. 20 ref. (N8, P12, ST)

429-N. (German.) **Crystallization of Undercooled Metal Alloys.** Werner Geller and Hans Garbeck. *Archiv für das Eisenhüttenwesen*, v. 26, no. 10, Oct. 1955, p. 611-621.

Nucleus formation and crystal growth; influence of foreign nuclei on undercooling ability of metals and alloys; thermo-analytical and metallographical investigation of undercooled alloys with formation of a normal eutectic and one of mixed crystals; undercooling ability of the system Fe-Fe_3P and the unstable system Fe-Fe_3P. Graphs, tables, micrographs. 46 ref. (N12, Fe)

430-N. (German.) **Interference Diagram of Solid and Liquid Selenium.** Gerhard Frohnmeyer, Hans Richter and Gerhard Schmelzer. *Zeitschrift für Metallkunde*, v. 46, no. 9, Sept. 1955, p. 689-692.

Curves of solid amorphous selenium at 20° C. and liquid selenium at 230 and 420° C., obtained by counting tube goniometric method. Photographs, graphs, table. 9 ref. (N12, Se)

431-N. (Russian.) **Kinetics of the Alpha→Gamma Transformation During the Rapid Heating of Carbon Steel, With Pearlite Structure of Varying Degrees of Dispersion.** V. N. Svechnikov, V. N. Gridnev and Iu. A. Kocherzhinskii. *Doklady akademii nauk SSSR*, v. 103, no. 6, Aug. 21, 1955, p. 1025-1026.

Equations involving time, temperature of heating and thermal capacity. 11 ref. (N8, CN)

432-N. (Russian.) **Effect of Sulfur on the Graphitic Structure of Magnesium Cast Iron.** A. D. Ushakov. *Liteinoe proizvodstvo*, 1955, no. 9, Sept., p. 19-20.

Chemical composition of cast iron. Microstructures, with and without various FeS additions. Table, micrographs. (N8, M27, CI)

433-N. (Russian.) **Recrystallization of Austenite at High Temperatures.** M. G. Lozinskii and E. I. Antipova. *Stal'*, v. 15, no. 9, Sept. 1955, p. 825-831.

New method of studying microstructure of different types of steel when heated in vacuum has brought out peculiarities of recrystallization process. Photographs, micrographs, graphs, table. 13 ref. (N5, N8, AY)

434-N. (Russian.) **Solid-Phase Reaction of the Interaction of Nickel With Zinc.** Ia. A. Ugai and Iu. A. Baslyk. *Zhurnal obshchei khimii*, v. 25, no. 9, Sept. 1955, p. 1645-1651.

Reaction studied by physical-chemical methods; significance of liquid phase in the mechanism of the solid-phase reactions; role of NiZn and $NiZn_3$ compounds. Graphs, phase diagram. 17 ref. (N12, Zn, Ni)

P
Physical Properties and Test Methods

426-P. Preparation and Electrical Properties of CdTe Single Crystals. F. A. Kröger and D. de Nobel. *Journal of Electronics*, v. 1, ser. 1, Sept. 1955, p. 190-202.

Shows that the type of conduction can be changed by varying the proportion between cadmium and tellurium, an excess of cadmium over the stoichiometric composition giving rise to *n*-type, and excess of tellurium to *p*-type conduction. Graphs, diagrams, tables. 8 ref. (P15, N12, Cd, Te)

427-P The Preparation, Electrical and Optical Properties of Mg_2Sn. W. D. Lawson, S. Nielsen, E. H. Putley and V. Roberts. *Journal of Electronics*, v. 1, ser. 1, Sept. 1955, p. 203-211.

Single crystals prepared and examined optically and electrically in attempt to compare the thermal and optical activation energies. Graphs. 8 ref. (P17, P16, Mg, Sn)

428-P. The Coefficients of Thermal Expansion for Zirconium. R. B. Russell. *Massachusetts Institute of Technology (U. S. Atomic Energy Commision)*, MIT-1073, Oct. 1951, 41 p.

Expansion coefficients of anisotropic (hexagonal) zirconium calculated from lattice parameters of an alloy containing 2.4% hafnium, from 0 to 600° C. Graphs, tables, photographs. 33 ref. (P11, Zr)

429-P. Study of Metal-Ceramic Interactions at Elevated Temperatures. F. H. Norton and W. D. Kingery. *Massachusetts Institute of Technology (U. S. Atomic Energy Commission)*, NYO-4631, July 1955, 14 p.

Measurements of surface and interface energy in the system, liquid nickel-solid alumina, completed for small additions of tin, indium, chromium and titanium in liquid phase. Table, graphs. (P12, Ni, Al, Ti, Cr, In, Sn)

430-P. The Adhesion of Amphipathic Molecules to Metal Surfaces. R. B. Waterhouse and J. H. Schulman. *Oil & Colour Chemists' Association, Journal*, v. 38, Oct. 1955, p. 646-651; disc., p. 651-654.

Structure and adhesion of simple molecules on copper, aluminum and iron surfaces studied by contact-angle measurements, coefficient-of-friction changes on rubbing metal surfaces, and electron-diffraction measurements on the deposited films. Graph, table. 7 ref. (P13, L general, Fe, Al, Cu)

431-P. Effect of Point Imperfections on the Electrical Properties of Copper. I. Conductivity. F. J. Blatt. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1708-1716.

Changes in resistivity due to the addition of substitutional impurities and the presence of vacancies or interstitials. Table, graphs. 40 ref. (P15, Cu)

432-P. Influence of Exchange and Correlation on Electric Transport in Metals. F. J. Blatt. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1735-1736.

Derivation of expressions relating electron energy to wave vectors. Table. 7 ref. (P15)

433-P. Precision Density Determination of Large Single Crystals by Hydrostatic Weighing. A. Smakula and V. Sils. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1744-1746.

Hydrostatic weighing method using ethylene bromide as the immersion liquid. Random and systematic errors. Accuracy of the order of 10^{-5} is reached. Tables, diagram. 26 ref. (P10)

434-P. Densities and Imprefections of Single Crystals. A. Smakula, J. Kalnajs and V. Sils. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1747-1750.

Densities of Si, Al, CaF_2, CsI, Ge, TlCl, TlBr and SiO_2 (quartz) computed from lattice constants and molecular weights obtained from International Atomic Weights, compared with densities as determined by hydrostatic weighting of large single crystals. Tables, graphs. 33 ref. (P10, M26)

435-P. Oscillatory Galvanomagnetic Properties of Antimony Single Crystals at Liquid Helium Temperatures. M. C. Steele. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1751-1759.

Measurements of Hall coefficient and transverse magnetoresistance in magnetic fields up to 25 kilogauss. Graphs. table. 14 ref. (P15, P16, Sb)

436-P. Thermomagnetic Anisotropy. Jerome I. Kaplan. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1808-1810.

Solution of the Boltzmann transport equation in a solid given for applied electric and magnetic fields and a temperature gradient. 7 ref. (P16, P15)

437-P. Electrical Properties of Germanium-Silicon Alloys. Alfred Levitas. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1810-1814.

Hall and resistivity measurements at 300 to 800° K. Graphs. 10 ref. (P15, Ge, Si)

438-P. Effects of Stress on Superconducting Sn, In, Tl, and Al. Nils L. Muench. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1814-1820.

Hydrostatic pressures of 0 to 100 atmos. obtained with helium gas pressure, and of 1.9×10^3 atmos. obtained by an ice expansion bomb technique used to measure pressure displacement of the critical temperature. Diagrams, graphs, tables. 20 ref. (P11, Sn, In, Tl, Al)

439-P. Gyromagnetic Ratio of Nickel at Low Magnetic Intensities. G. G. Scott. *Physical Review*, v. 99, ser. 2, Sept. 15, 1955, p. 1824-1825.

Extrapolated zero intensity value is 1.801. At a higher induced magnetic intensity, the effective value changes to 1.830. Tables, graph. 4 ref. (P16, Ni)

440-P. Shape and Crystal Anisotropy of Alnico 5. E. A. Nesbitt and H. J. Williams. *Journal of Applied*

Physics, v. 26, Oct. 1955, p. 1217-1221.

It is concluded from torque measurements on single crystals that high coercive force depends on shape anisotropy of the fine precipitated plates and that the crystal anisotropy is negligible. Graphs, micrographs. 6 ref. (P16, M26, SG-n)

441-P. On Representation of Electromagnetic Fields in Cavities in Terms of Natural Modes of Oscillation. S. A. Schelkunoff. *Journal of Applied Physics*, v. 26, Oct. 1955, p. 1231-1234.

When expressing admittance of a cavity excited through a hole in terms of frequencies that can exist when cavity is short-circuited, the short-circuit must conform to the impressed field. Diagrams. 6 ref. (P16)

442-P. Effect of Water Vapor on Grown Germanium and Silicon *np* Junction Units. J. T. Law and P. S. Meigs. *Journal of Applied Physics*, v. 26, Oct. 1955, p. 1265-1273.

Investigation of effect on photoresponse curves and reverse current characteristics. Tables, graphs. 14 ref. (P15, Ge, Si)

443-P. Permanent-Magnet Properties of Elongated Single-Domain Iron Particles. L. I. Mendelsohn, F. E. Luborsky and T. O. Paine. *Journal of Applied Physics*, v. 26, Oct. 1955, p. 1274-1280.

Shape anisotropy overcomes limitation imposed on energy of other fine-particle iron magnets by low crystal anisotropy of iron. Tables, micrographs, graphs. 30 ref. (P16, Fe)

444-P. Diffusion Effects in Magnetic Resonance of the Alkali Metals. C. P. Slichter. Paper from "Defects in Crystalline Solids". The Physical Society, p. 52-59, disc., p. 424-425.

Characteristics of lithium, sodium and rubidium at different temperatures and in independent static field fluxes. Graphs. 13 ref. (P16, M26, N1, Li, Na, Rb)

445-P. (Russian.) Photoelectric Effect in Metals. S. V. Vonsovskii, A. V. Sokolov and A. Z. Veksler. *Uspekhi fizicheskikh nauk*, v. 56, no. 4, Aug. 1955, p. 477-530.

Premises for constructing quantum theory of photo-electric effect, and Fɛuler's quasi-phenomenological theory; quantum-mechanical theory of the photo-electric effect in metals; surface photo-electric effect in ordered alloys and ferromagnetic metals. Graphs. 65 ref. (P15)

446-P. (Russian.) Mechanism of Hydrogen Overvoltage on Nickel, Platinum, and Other Metals. P. D. Lukovtsev and S. D. Levina. *Zhurnal fizicheskoi khimii*, v. 29, no. 8, Aug. 1955, p. 1508-1512.

Corrections of and additions to previous equations concerning this phenomenon. 35 ref. (P15, Ni, Pt, Pb, Co, Fe, Pd)

447-P. (Russian.) Synthesis and Properties of Columbium Bronzes. E. I. Krylov and A. A. Sharnin. *Zhurnal obshchei khimii*, v. 25, no. 9, Sept. 1955, p. 1680-1685.

Chemical formulas, crystal lattice, colors of compounds, magnetic sensitivity of bronzes, electrical resistance of powder at different pressures. Tables. 10 ref. (P general, M26, Cu)

448-P. (Spanish.) General View of the Electrochemical Behavior of Metals. II. Marcel Pourbaix. *Instituto del hierro y del acero*, v. 8, no. 36, Apr.-June 1955, p. 124-135.

Study of the behavior of iron in the presence of solutions free of oxidizing agents and with oxygen; differential aeration of iron; behavior of iron in contact with another metal. Diagrams, graphs, tables. 14 ref. (P15, Fe)

449-P. The Electrochemical Behavior of the Tungsten Electrode and the Nature of the Different Oxides of the Metal. S. E. S El Wakkad, H. A. Rizk and I. G. Ebaid. *Journal of Physical Chemistry*, v. 59, Oct. 1955, p. 1004-1008.

It has been found possible to define clearly the *p*H range over which the electrode functions properly. Anodic oxidation at low current density is studied. Graphs. 9 ref. (P13, P15, W)

450-P. On the Melting Point of Germanium. F. X. Hassion, C. D. Thurmond and F. A. Trumbore. *Journal of Physical Chemistry*, v. 59, Oct. 1955, p. 1076-1078.

Experiments indicate the best value to be 937.2 + 0.5° C. Freezing points determined from cooling curves on germanium melts under high vacuum, in contact with GeO_2 or exposed to hydrogen, helium, argon or nitrogen atmospheres. Table. 20 ref. (P12, Ge)

451-P. Optical Constants of Metals in the Infra-Red—Conductivity of Silver, Copper and Nickel. J. R. Beattie and G. K. T. Conn. *Philosophical Magazine*, v. 46, 7th ser., no. 380, Sept. 1955, p. 989-1001.

Attention given to preparation of surfaces, including hand and electrolytically polished, and those obtained by evaporating *in vacuo*. Graphs, tables. 16 ref. (P17, Ni, Cu, Ag)

452-P. Ferromagnetic Resonance in Nickel and in Some of Its Alloys. K. J. Standley and K. H. Reich. *Physical Society, Proceedings*, v. 68, no. 430B, Oct. 1955, p. 713-722.

From microwave measurements, *g* values and line widths for nickel and its alloys containing copper, aluminum, antimony and manganese were determined. Tables, graphs. 19 ref. (P16, Ni)

453-P. The General Motion of Conduction Electrons in a Uniform Magnetic Field, With Application to the Diamagnetism of Metals. P. G. Harper. *Physical Society, Proceedings*, v. 68, no. 430A, Oct. 1955, p. 879-892.

From translational properties of the Hamiltonian, a standard form is derived for wave functions. 11 ref. (P16)

454-P. (Czech.) Physical Properties of Spheroidal Cast Iron. Frantisek Kohl. *Slévarenstvi*, v. 3, no. 9, Sept. 1955, p. 265-269.

Modulus of elasticity, damping capacity, magnetic and electric values compared with physical properties of gray and inoculated cast irons. Spheroidal cast iron is recommended instead of gray iron for electrical products. Micrographs, tables, graphs. 2 ref. (P15, P16, Q21, Q8, CI)

455-P. (Czech.) A New Method of Measuring the Tendency for the Development of Shrinkage-Cavities. Vaclav Oliverius and Josef Vaculik. *Slévarenstvi*, v. 3, no. 9, Sept. 1955, p. 269-272.

Describes and compares new test technique. Tables, diagrams, photographs. (P10, E25, Al, CI)

456-P. (German.) The Stability of Guinier-Preston Zones in Aluminum-Copper Alloys. Hermann Franz and Ekkehart Kröner. *Zeitschrift für Metallkunde*, v. 46, no. 9, Sept. 1955, p. 639-646.

Distortion energy in the passage from G.P.I. to G.P. II, effect of change energy of co-axial dislocation rings. Graphs. 12 ref. (P12, Al, Cu)

457-P. (Russian.) Thermodynamic Theory of Magnetic Relaxation. G. R. Khutsishvili. *Zhurnal eksperimental'noi i teoreticheskoi fiziki*, v. 29, no. 3, Sept. 1955, p. 329-333.

Uses the principle of symmetry of kinetic coefficients to find relationship of magnetization and internal temperature of spin-system to time. Conditions under which internal spin-equilibrium is attained more quickly than the equilibrium of the spin-system with lattice. 5 ref. (P16)

458-P. (Russian.) Effect of the Demagnetization Method in a Nickel Specimen on the Temperature Dependence of the Magnetized State in Weak Fields. A. I. Drokin and V. L. Il'iushenko. *Zhurnal eksperimental'noi i teoreticheskoi fiziki*, v. 29, no. 3, Sept. 1955, p. 339-344 + 1 plate.

Two methods for studying the effect; description of the astatic magnetometer. Circuit diagrams, graph, tables. 10 ref. (P16, Ni)

459-P. (Russian.) Photoelectric Properties of Some Compounds With the Zinc Blende Structure. N. A. Goriunova, V. S. Grigor'eva, B. M. Knovalenko and S. M. Ryvkin. *Zhurnal tekhnicheskoi fiziki*, v. 25, no. 10, Sept. 1955, p. 1675-1682.

Investigation conducted with gallium, indium and tellurium alloys. Tables, graphs. 8 ref. (P15, Ga, In, Te, Zn)

460-P. (Pamphlet.) Physical and Mechanical Properties of Mallory Sharon Titanium Alloys. 13 p. 1955. Mallory-Sharon Titanium Corp., Niles, Ohio.

Complete resume of each Mallory-Sharon titanium alloy. (P general, Q general, Ti)

Q

Mechanical Properties and Test Methods; Deformation

1040-Q. Abrasive Jet Method for Measuring Abrasion Resistance of Organic Coatings. A. G. Roberts, W. A. Crouse and R. S. Pizer. *ASTM Bulletin*, 1955, no. 208, Sept., p. 36-41.

Simple, rapid, reproducible method. Photographs, tables, graphs. (Q9)

1041-Q. A Transistor Torquemeter. J. A. Freer. *Electronic Engineering*, v. 27, Oct. 1955, p. 430-433.

Value of torque is inferred from measurement of relative phase between waveforms produced by generators attached at either end of shaft. Diagrams, circuit diagrams. 6 ref. (Q1)

1042-Q. Crack Formation and Stress Concentration Effects in Direct Stress Fatigue. I. N. E. Frost. *Engineer*, v. 200, Sept. 30, 1955, p. 464-467.

Reversed tests carried out on V-notched cylindrical specimens of aluminum alloys. Graphs, micrographs, tables. 5 ref. (To be continued.) (Q7, Al)

1043-Q. New Stainless Steels Qualify for High-Temperature Service. II. E. A. Loria. *Iron Age*, v. 176, Oct. 13, 1955, p. 109-111.

Recent research on stainless steels was aimed at development of nickel-free grades. One such steel—Crucible CMC—has high resistance under stress at high temperatures. It also has good oxidation resistance at temperatures up to 2100° F. Graph, tables. 2 ref. (Q3, Q4, R2, SS)

1044-Q. 475° C. Embrittlement of Chromized Coatings on Low Carbon Steel. W. L. Chu. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Oct. 1955, p. 1121-1123.

Coating structure and composition

can be correlated with chromizing process and prior carbon content of steel. Photograph, table, micrographs. 3 ref. (Q23, L15, Cr, CN)

1045-Q. The Effect of Neutron Flux on the Mechanical Properties of Aluminum Alloys. R. V. Steele and W. P. Wallace. *Livermore Research Laboratory, California Research and Development Company (U. S. Atomic Energy Commission),* LRL-145, May 1954, 20 p.

Aluminum alloys 2S-O, 2SH-14, 52S-O, 52S-H34, 61S-O, 61S-T6 and A54S were irradiated at a maximum temperature of 150° F. to a total neutron irradiation of 1.26 x 10^{21} neutrons per sq.cm. in order to determine the effect of neutron irradiation on the mechanical properties. It was determined that the flow stress was increased markedly, particularly for the soft tempers, by the neutron exposure. The usual tensile strength was increased by the irradiations, whereas the percentage of elongation was decreased, but not in every case. Graphs, tables, photograph, diagram. (Q27, P10, Al)

1046-Q. Factors Influencing Friction & Wear With Solid Lubricants. M. B. Peterson and R. L. Johnson. *Lubrication Engineering,* v. 11, Sept.-Oct. 1955, p. 325-330.

Most data obtained with molybdenum sulfide using low-speed friction and wear apparatus for steel test specimens. Photograph, graphs, tables, micrograph. 8 ref. (Q9, ST)

1047-Q. The Structure and Mechanical Properties of White Irons. W. J. Williams. *Metallurgia,* v. 52, no. 311, Sept. 1955, p. 129-134.

Specimens of white iron, even when cast from the same melt, may show a scatter in mechanical test results of as much as ± 20% of the average value. Structure of white irons, way in which changes in structure are likely to influence mechanical properties. Micrographs, photographs. 3 ref. (Q general, M27, CI)

1048-Q. Ductile Iron-Aluminum Alloys. Eric R. Morgan and Victor F. Zackay. *Metal Progress,* v. 68, Oct. 1955, p. 126-128.

Ductile iron-aluminum alloys with oxidation resistance and high-temperature strength, equivalent to conventional stainless steels, produced by vacuum melting. Graphs, photographs. (Q23, R2, D8, SG-h)

1049-Q. Large Elastic Deformation of Isotropic Materials. X. Reinforcement by Inextensible Cords. J. E. Adkins and R. S. Rivlin. *Royal Society of London, Philosophical Transactions,* v. 248, ser. A, no. 944, Sept. 1955, p. 201-223.

Pure homogeneous deformation of thin sheet, flexure of cuboid containing inextensible cords, simultaneous extension, inflation and torsion of reinforced cylindrical tube. 12 ref. (Q21)

1050-Q. How to Test Refractory Metals. J. W. Pugh. *Steel,* v. 137, Oct. 17, 1955, p. 114-117.

Equipment and methods for tensile and creep-rupture tests. Photographs, diagrams. (Q3, Q4, Q27, EG-d)

1051-Q. Mechanical Properties of Aluminum Honeycomb Cores. Edward W. Kuenzi. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1849, Sept. 1955, 57 p.

Results of tests on commercially produced aluminum honeycomb cores for use in structural sandwich construction. Graphs, photographs, tables, diagram. 14 ref. (Q general, Al)

1052-Q. (Dutch.) **Morphological Study of the Phenomenon of Fracture.** J. Leeuwerik and F. Schwarzl. *T.N.O.-Nieuws,* v. 10, no. 114, Sept. 1955, p. 367-374.

Significance of microstructure in the fracture process; origin of fracture; direction of the propagation of fracture. Mechanism and rate of fracture. Micrographs, diagrams, graphs. 4 ref. (Q26, M27)

1053-Q. (French.) **Ultrasonic Measurements of the Elastic Constants of Solids.** Guy Mayer and Jean Gigon. *Journal de physique et le radium,* v. 16, nos. 8-9, Aug.-Sept. 1955, p. 704-706.

Process for the emission of acoustical waves in gases provides new method for measuring Young and Poisson moduli and the internal friction of solids. Diagram. 6 ref. (Q21, Q22)

1054-Q. (French.) **Determination of the Elastic Constants of Metallic Materials by Measuring the Propagation of Sound. Application to Cast Iron.** H. J. Seemann and H. Schmauch. *Revue de métallurgie,* v. 52, no. 8, Aug. 1955, p. 621-628; disc., p. 628.

Results discussed in relation with cast iron graphite nature and compared with moduli determined values obtained by static procedures. Diagram, photographs, graphs, micrographs. 14 ref. (Q21, P10, CI)

1055-Q. (French.) **Plastic Deformation of Refined Aluminum and Alloyed Aluminum Monocrystals.** B. Jaoul and I. Bricot. *Revue de métallurgie,* v. 52, no. 8, Aug. 1955, p. 629-642.

Transition point in load extension curve varies according to purity. Graphs, micrographs, photographs, tables. 27 ref. (Q24, Al)

1056-Q. (French.) **Some Observations About Temper Brittleness.** L. Colombier. *Revue de métallurgie,* v. 52, no. 8, Aug. 1955, p. 643-656; disc., p.656-659.

Investigation of change in transition point of tensile strength temperatures diagram for steel grades, in which analysis of one constituent was varied. Tables, graphs. 6 ref. (Q23, ST)

1057-Q. (German.) **Why Aluminum Bearings?** Obering A. Buske and F. W. Rabenau. *Aluminium,* v. 31, no. 10, Oct. 1955, p. 493-498.

Some tested alloys which have rendered good service. Photographs, micrographs, graphs. (Q9, T7, Al)

1058-Q. (German.) **Hardness Determination of Solid Bodies. I.** P. Grodzinski. *Archiv für technisches Messen,* 1955, no. 236, Sept., p. 201-204.

Principles and different methods of hardness determination, static macro and microhardness, scratch hardness, hardness scales. Graphs, table. 82 ref. (Q29)

1059-Q. (Russian.) **Plastic Flow of Anisotropic Films.** M. S. Mikeladze. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 8, Aug., p. 67-80.

Basic laws of plastic flow of anisotropic media; equations for plastic equilibrium of single and multilayer films or coatings; nature of deformations and stress distribution. 11 ref. (Q24, L general)

1060-Q. (Russian.) **Complex Loading and Theories of Plasticity of Isotropic Metals.** A. M. Zhukov. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 8, Aug., p. 81-92.

Formulas for theory of small elasto-plastic deformations and theory of flow. Fracture in metals stressed bi-axially; tension-torsion equations. Graphs, table. 10 ref. (Q23, Q24)

1061-Q. (Russian.) **Rolled and Recrystallization Textures of Titanium.** N. V. Ageev and A. A. Babareko. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 8, Aug., p. 100-106.

Recrystallization orientations, deformation mechanisms, twinning, slip phenomena, effect of rolling temperature and technique on texture, deformation percentage with recrystallization and resulting texture. X-rays, diagrams. 12 ref. (Q24, N5, Ti)

1062-Q. (Russian.) **Resistance to Repeated Bending of Steel Strips With Weld-Attached Transverse Ribs.** V. A. Bykov and V. A. Nikitin. *Svarochnoe proizvodstvo,* 1955, no. 9, Sept., p. 8-10.

Fatigue and yield point compared in low-alloy and carbon steel test pieces; factors affecting development and position of failure. Graphs, tables, diagrams. 3 ref. (Q7, Q5, CN, AY)

1063-Q. (Russian.) **Cold Shortness of Welded Seams Made by Automatic Welding Under Flux.** A. G. Mazel and E. M. Rogova. *Svarochnoe proizvodstvo,* 1955, no. 9, Sept., p. 11-13.

Impact toughness of low-alloy and unalloyed steels at various temperatures. Threshold temperature of cold shortness, chemical composition of welded seams. Tables, graphs. 7 ref. (Q6, K1, ST, AY)

1064-Q. (Russian.) **Antifriction Properties of Spheroidal Cast Iron.** I. O. Tsypin, P. I. Durasov and N. F. Verzhbitskii. *Vestnik mashinostroeniia,* v. 35, no. 9, Sept. 1955, p. 56-61.

Microstructures and chemical compositions of spheroidal pearlitic, pearlito-ferritic, other cast iron. Wear in roller bearings and bushings of cast iron, and running-in tests. Micrographs, diagrams, tables. 3 ref. (Q9, M27, CI)

1065-Q. High Temperature Effects in Aircraft Structures. N. J. Hoff. *Applied Mechanics Review* v. 8, Nov. 1955, p. 453-456.

Reduction in strength and stiffness, thermal stresses and buckling, effects of creep on distribution and failure, creep buckling. 61 ref. (Q general, T24)

1066-Q. Deoxidation of Malleable Iron. Ariel Taub. *Foundry,* v. 83, Nov. 1955, p. 131-133.

Effect on malleabilization and final mechanical properties after introducing aluminum into the cupola melt. Micrographs, graph, table. (Q general, E10, Al, CI)

1067-Q. Rapid Creep in Structures. N. J. Hoff. *Journal of the Aeronautical Sciences,* v. 22, Oct. 1955, p. 661-672, 700.

Proposes that rapid creep be tolerated when areodynamic heating causes high temperatures for only a short time in structural elements of supersonic aircraft. Tables, graphs, diagrams, photographs. 33 ref. (Q3)

1068-Q. Theory of Steady-State Creep Based on Dislocation Climb. J. Weertman, *Journal of Applied Physics,* v. 26, Oct. 1955, p. 1213-1217.

It is assumed in the analysis that the rate-controlling process is the diffusion of vacancies between dislocations which are creating vacancies and those which are destroying them. Graph, tables. 19 ref. (Q3, M26)

1069-Q. Heat Treated Titanium Offers New Design Possibilities. *Metal Treating,* v. 6, Sept.-Oct. 1955, p. 20-21.

Treatment of Rem-Cru C-130 AM (4Mn-4Al) increases elevated tem-

perature strength, creep, fatigue and shear strength, but apparently neither decreases ductility nor increases notch sensitivity. Graphs. (Q general, J general, Ti)

1070-Q. (French.) Abrasive Effect of Light Alloys on Cutting Tools. Carlo Panseri and Gino Bedeschi. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 177-183; disc., p. 183.

Abrasive power depends on structure, quantity, degree of subdivision and hardness of insoluble constituents. Photographs, diagrams, tables, micrographs. (Q9, G17, EG-a)

1071-Q. (French.) The Viscosity of Metallic Wires. Constantin Salceanu. *Comptes rendus,* v. 241, no. 12, Sept. 19, 1955, p. 734-736.

Apparatus for measuring, based on determination of the time necessary to reduce half the initial amplitude of the oscillations of a torsion pendulum, whose suspension wire is made of the metal to be studied. Results of tests on aluminum wire given. Diagram, table. 1 ref. (Q1, Al)

1072-Q. (Hungarian.) Examination of the Properties of Special Ductile Alpha + Beta Yellow Brass, as Affected by Heat Treatment. II. Ede Bella. *Kohaszati lapok,* v. 10, no. 9, Sept. 1955, p. 425-427.

Most important mechanical properties of the experimental alloys. Heat treatment experiments. Micrographs. (To be continued.) (Q23, J general, Cu)

1073-Q. (Russian.) First Basic Problem of the Theory of Elasticity for a Region With a Plane Circular Hole. V. I. Mossakovskii. *Prikladnaia matematika i mekhanika,* v. 19, no. 4, July-Aug. 1955, p. 443-452.

Calculations for an elastic region (an isotropic elastic body of infinitely large dimensions) which has been weakened by a plane circular hole. 10 ref. (Q21)

1074-Q. An Investigation of Fatigue Failures in Structural Members of Ore Bridges Under Service Loadings. L. T. Wyly and M. B. Scott. *American Railway Engineering Association Bulletin,* v. 57, no. 524, Sept.-Oct. 1955, p. 175-297.

Field tests made on ore handling bridges and a study of actual failure records. Recommendations for improving fatigue life of structural members. Graphs, tables, diagrams. (Q7, ST)

1075-Q. Rail Corrugation—Can It Be Prevented? C. H. Spaderna. *American Railway Engineering Association, Bulletin,* v. 57, no. 524, Sept.-Oct. 1955, p. 307-312.

High train speeds may bring forth undulations 0.01 in. deep that accelerate wear on rails; establishes a relation between natural frequencies of rail vibration and wave length of the corrugation. Tables, diagrams. (Q9, ST)

1076-Q. Room and Elevated-Temperature Mechanical Properties of AISI Type 414 and Type 431 Stainless Steels. E. J. Dulis, S. J. Parker and P. W. Marshall. *American Society for Metals, Transactions,* v. 48, *Preprint No.* 41, 1955, 23 p.

To evaluate the applicability of the steels as materials for the construction of equipment used under stress at elevated temperatures, the room and elevated-temperature tensile properties in the range 700 to 1100° F., creep and creep-rupture properties in the range 900 to 1200° F., and keyhole-notch Charpy transition temperatures were determined. Tables, micrographs, graphs. 6 ref. (Q27, Q3, Q4, Q6, SS)

1077-Q. Deformation Mechanisms of Alpha-Uranium Single Crystals. L. T. Lloyd and H. H. Chiswik. *Argonne National Laboratory (U. S. Atomic Energy Commission),* ANL-5367, Dec. 1954, 99 p.

Considers slip, twinning, cross-slip and kinking. Diagrams, graphs, micrographs, tables. 47 ref. (Q24, U)

1078-Q. Welding Stresses Crack Penstocks. *Engineering News-Record,* v. 155, Nov. 3, 1955, p. 32-33.

A specific case of the effect of locked-in stresses, from welding heavy steel plates, and the costly remedial measures required. Photograph, diagram. (Q25, K general, ST)

1079-Q. The Effect of Different Chromium Deposits on the Fatigue Strength of Hardened Steel. Jesse E. Stareck, Edgar J. Seyb, Jr., and Angelo C. Tulumello. *Plating,* v. 42, Nov. 1955 p. 1395-1402.

Effect is related to stress in deposit; study made on SAE 4140. Tables, graphs. 16 ref. (Q7, L17, Cr, ST)

1080-Q. Brittle Fracture and Yielding. A. N. Stroh. *Philosophical Magazine,* v. 46, 7th ser., no. 380, Sept. 1955, p. 968-972.

Stresses around a piled-up group of dislocations may initiate a crack or pull it from its locking impurities. 10 ref. (Q23, Q26)

1081-Q. Fatigue Properties of Comparable Cast and Wrought Steels. *Steel Founders' Society of America, Research Report No.* 35, Oct. 1955, 40 p.

Effects of steel composition, heat treatment, surface finish, directionality and section size on fatigue of small standard notched and smooth bar laboratory specimens in rotary bending. Tables, graphs, diagrams. 24 ref. (Q7, CI, ST)

1082-Q. Elastic Stability of Cylindrical Sandwich Shells Under Axial and Lateral Load. Everett Eugene Haft. *U. S. Department of Agriculture, Forest Products Laboratory, Report No.* 1852, July 1955, 24 p. + 9 plates.

Mathematical analyses and curves that show how buckling load changes as parameters change. Diagrams, graphs. 4 ref. (Q28, Q21)

1083-Q. A Universal Column Formula for Load at Which Yielding Starts. L. H. Donnell and V. C. Tsien. *U. S. National Advisory Committee for Aeronautics, Technical Note* 3415, Oct. 1955, 48 p.

Accounts for initial defects and yielding limit of materials. Diagrams, graphs, photographs, table. 12 ref. (Q23)

1084-Q. Ductility Tests for Electrical Conductors. Louis Boleraski. *Wire and Wire Products,* v. 30, Oct. 1955, p. 1210 + 4 pages.

With coordination of electrical conductivity measurements, durability and practicability are determined prior to costly cable fabrication and installation. Photographs, graphs. (Q23, P15, Al)

1085-Q. (Czech.) The Relaxation Testing of Metals at High Temperatures. Alexander A. Chit'kov. *Hutnické listy,* v. 10, no. 9, Sept. 1955, p. 521-525.

Requires special automatic devices or calculation from residual elastic strains on round test specimens and models of flanged joints stressed in tension, test rings stressed in bending and helical springs stressed in torsion. Graphs, diagrams. (Q21, Q25)

1086-Q. (German.) Influence of the Degree of Stress on Fatigue Strength. H. O. Meuth. *Metall,* v. 9, nos. 19-20, Oct. 1955, p. 861-867.

Experimental investigation on mild carbon steel and the aluminum-magnesium alloy, Hy7. Graphs, tables, micrographs. 15 ref. (Q7, Al, CN)

1087-Q. (German.) Tensile Test of Tubes With Bore-Diminished Circumferential Seams. Kurt Kautz. *Schweissen und Schneiden,* v. 7, no. 9, Sept. 1955, p. 384-386.

Proposes simple method for examination of welded pipe joints. Photographs, tables, diagram. (Q27, K9)

1088-Q. (German.) The Bending Test. N. Ludwig. *Schweissen und Schneiden,* v. 7, no. 9, Sept. 1955, p. 387-391.

Conventional specimens and performances compared when bent according to German standards. Photograph, tables, diagrams. 10 ref. (Q5, K9)

1089-Q. (German.) Determination of Fatigue Strength of Welded Joints. Karl Wellinger. *Schweissen und Schneiden,* v. 7, no. 9, Sept. 1955, p. 392-396.

Compares forced and endurance fractures; influence of surface quality of test specimens and finished parts. Photographs, diagrams, graphs, table. (Q7, Q26, K9)

1090-Q. (German.) Creep Strength Tests at Welded Joints. Wilhelm Ruttmann. *Schweissen und Schneiden,* v. 7, no. 9, Sept. 1955, p. 397-399.

Supplementary considerations on proposed German standards. Table, diagrams. 4 ref. (Q3, K9)

1091-Q. (German.) Determination of Thermal Crack Resistance. E. Kauhausen and P. Kaesmacher. *Schweissen und Schneiden,* v. 7, no. 9, Sept. 1955, p. 400-404.

Problems of testing austenitic electrodes. Photographs, diagrams. (Q26, K9)

1092-Q. (German.) Approximate Calculation of "Notch Toughness-Temperature" Curves in the Region of the Transition Temperature. Heinz Kornfeld. *Stahl und Eisen,* v. 75, no. 20, Oct. 6, 1955, p. 1324-1330.

Six examples show different types of fracture, probability of mixed fracture. Tables, graphs. (Q23, Q26, ST)

1093-Q. (German.) Hardening of Aluminum-Silver Alloys. IX. X-Ray Investigation of Cold-Hardening. X. Temperature Dependence of Electrical Resistance. Volkmar Gerold, Werner Köster and Alfons Knödler. *Zeitschrift für Metallkunde,* v. 46, no. 9, Sept. 1955, p. 623-639.

Interpretation of radiographic findings. Temperature-resistance curves of aluminum alloys with 3.5 to 55.6 wt.% silver. Graphs, tables. 44 ref. (Q29, P15, Ag, Al)

1094-Q. (German.) Slip Mechanism and Surface Phenomena in Face Centered Cubic Metals. Jörg Diehl, Siegfried Mader and Alfred Seeger. *Zeitschrift für Metallkunde,* v. 46, no. 9, Sept. 1955, p. 650-657.

Theoretical and experimental data of problem. Method of sample making. Diagram, graph, table, photographs. 35 ref. (Q24)

1095-Q. (German.) Smelted Metal Properties. XI. Internal Friction of Magnesium-Tin Alloys. Erich Gebhardt, Manfred Becker and Heinrich Sebastian. *Zeitschrift für Metallkunde,* v. 46, no. 9, Sept. 1955, p. 669-672.

Experiments and data on relation of internal friction, temperature, concentration and activating energy of viscous flow. Graphs, tables. 16 ref. (Q22, Mg, Sn)

1096-Q. (Russian.) Law of Friction With Highly Elastic Materials Along Hard Smooth Surfaces. G. M. Bartenev. *Doklady akademii nauk, SSSR,* v. 103, no. 6, Aug. 21, 1955, p. 1017-1020.

Relation of friction force to normal pressure. Graphs. 11 ref. (Q9)

1097-Q. (Russian.) **Problems of Dynamic Strength in Rotors and Turbogenerators.** R. D. Vagapov, F. M. Dimentberg and S. V. Serensen. *Izvestiia akademii nauk SSSR, otdelenie tekhnicheskikh nauk,* 1955, no. 9, Sept., p. 65-106.

Vibratory stressed state of rotor, distribution of stresses in the most dynamically stressed parts of the rotor, strength of rotor during action of alternating stresses, fatigue. Graphs, diagrams, tables. 26 ref. (Q23, Q25, Q7, ST)

1098-Q. (Russian.) **Investigation of the Interaction of Lubricating Oils With Metals.** G. V. Vinogradov, M. M. Kusakov, Iu. S. Zaslavskii and E. A. Razumovskaia. *Vestnik akademii nauk SSSR,* v. 25, no. 9, Sept. 1955, p. 35-40.

Relation of wear spots to axial loads and of amount of sulfur, per surface area, to temperature. Types of lubricants for various steels. Graphs. (Q9, ST)

1099-Q. (Russian.) **Method for Determining the Tendency of Structural Steel to Deformation Aging.** K. M. Pogodina-Alekseeva. *Zanadskaia laboratoriia,* v. 21, no. 9, 1955, p. 1104-1106.

Influence of deformation aging on strength properties of structural 3KP steels; description of the method and installation used. Graphs. (Q24, N7, ST)

1100-Q. (Russian.) **Method of Testing Metals for Abrasive Wear.** V. V. Podgaetskii. *Zavodskaia laboratoriia,* v. 21, no. 9, 1995, p. 1109-1110.

Installations and testing procedure. Table, photograph, diagram. (Q9)

1101-Q. (Spanish.) **Comparison Between the Flow-Bending Test on a Notched Specimen and the Charpy Test on a Notched V-Specimen in Order to Evaluate the Susceptibility of Carbon-Manganese Steel to Notching.** W. Barr, J. H. Van der Veen, Per Matton-Sjöberg, H. Herbiet and H. Vinter. *Ciencia y técnica de la soldadura,* v. 5, no. 25, July-Aug. 1955, 13 p.

Two tests resulted in an analogous classification for carbon-manganese steel plate specimens 25.4 mm. thick. Diagram, graphs, tables. (Q23, Q6, AY)

1102-Q. (Swedish.) **Lead in Cast Iron; Its Effect on Mechanical Properties and Its Removal From Molten Iron in Induction Furnace.** G. Ostberg. *Gjuteriet,* v. 45, no. 7, July 1955, p. 96-98.

Presence of lead in gray cast iron, usually caused by contamination from scrap, was found to lower the tensile and impact properties while raising the hardness. Laboratory experiments with 2 k-g. melts carried out to find a guide for the removal of lead in induction furnaces by evaporation at constant temperature. Tables, graphs. 5 ref. (Q23, Q6, Q29, D6, CI)

R

Corrosion

448-R. Preventing Corrosion of Ships With Zinc and Magnesium Protectors. I. D. G. Berwick. *Canadian National Research Council, Technical Information Service Report No.* 44, Sept. 1955, 11 p.

Corrosion mechanisms, application and use of zinc and magnesium anodes. Diagrams. (R10, Zn, Mn)

449-R. Corrosion in the Brewery. III. D. H. Edmonds. *Corrosion Prevention and Control,* v. 2, Sept. 1955, p. 37-42.

Problems and preventive measures in bottle washing machines, pasteurizers, filters and refrigerating apparatus. Photographs. (R4)

450-R. Stress-Corrosion Resistance of Magnesium Alloys. *Corrosion Prevention and Control,* v. 2, Sept. 1955, p. 53-55.

Investigation of effects of both marine and inland atmospheres on materials for aircraft use. Graph, table. (R1, R3, Mg)

451-R. Influence of Specimen Area on the Pitting Probability of Aluminum. P. M. Aziz and Hugh P. Godard. *Electrochemical Society, Journal,* v. 102, Oct. 1955, p. 577-579.

Pit sites are not due to specific local macrodefects in the metal surface but arise in a random fashion through the interaction of myriads of anodic and cathodic elements on the surface between which local action currents flow on initial immersion of the sample in the corrosive environment. Tables, graph. 7 ref. (R2, R4, Al)

452-R. (Japanese.) **On Testing Methods for the Intergranular Corrosion Susceptibility of 18-8 Stainless Steels.** Hideo Togano. *Government Chemical Industrial Research Institute, Tokyo, Reports,* v. 50, no. 8, Aug. 1955, p. 267-278.

Author studies detecting ability of 5% sulfuric, 65% nitric, and nitric-hydrofluoric acid tests; proposes improved measures. Tables, graphs, micrographs, diagrams, 10 ref. (R11, SS)

453-R. Blockage and Corrosion of Plate and Tubular Recuperative Air Heaters. B. Lees. *Institute of Fuels, Journal,* v. 28, Sept. 1955, p. 433-440, 450 + 1 plate.

New method of investigating air-heater corrosion; measures adopted to overcome corrosion and blockage of some tubular and plate-type air heaters. Tables, diagrams, graphs, photographs. 12 ref. (R4)

454-R. Corrosion of Metals in the Tropics. H. R. Ambler and A. A. J. Bain. *Journal of Applied Chemistry,* v. 5, Sept. 1955, p. 437-467.

Atmospheric corrosion of a few common metals studied at more than 20 sites in Nigeria and at some others under various conditions of atmospheric humidity and salinity. Contrary to general belief, corrosion is not generally greater under tropical conditions than in temperate climates. Map, tables, photographs, graphs. 10 ref. (R3)

455-R. Current Status of Corrosion Mitigation Knowledge on Sweet Oil Wells. A Report on Technical Unit Committee T-1C on Sweet Oil Well Corrosion. *Corrosion,* v. 11, Oct. 1955, p. 61-63.

Methods include coating tubing, inhibitors and alloy tubing. Table. (R10, R7)

456-R. Surface Pipe Effect—Cathodic Protection of Oil Well Casing. Jack P. Barrett. *Corrosion,* v. 11, Oct. 1955, p. 415-416.

Potential profile curve shows abrupt anodic slope at base of surface pipe. Graph, photograph. (R10)

457-R. The Effect of Martensite on Sulfide Stress Corrosion Cracking. M. F. Baldy and R. C. Bowden, Jr. *Corrosion,* v. 11, Oct. 1955, p. 417-422.

When martensite begins to show continuity in microstructure, steel becomes susceptible to cracking. Tables, photographs, graphs, micrographs. 1 ref. (R1, M27, ST)

458-R. Basic Essentials for the Reduction of Atmospheric Corrosion. Frank Radecke. *Corrosion,* v. 11, Oct. 1955, p. 437-441.

Selection of paint with respect to environmental severity, surface preparation, dry film thickness and number of coats to be applied. 1 rtef. (R3, L28)

459-R. Microbiological Corrosion of Iron and Steel. David M. Updegraff. *Corrosion,* v. 11, Oct. 1955, p. 442-446.

Review of literature, brief account of historical aspects, discussion of corrosive mechanisms, description of typical examples, suggestions for prevention. 21 ref. (R1, Fe, ST)

460-R. Air Injection for Prevention of Hydrogen Penetration of Steel. W. A. Bonner and H. D. Burnham. *Corrosion,* v. 11, Oct. 1955, p. 447-452; disc., p. 452-453.

Concerned with hydrogen produced by corrosion reaction of steel with hydrogen sulfide at or slightly above atmospheric temperature. Graphs, table. 7 ref. (R7, ST)

461-R. The Corrosion Resistance of Wrought Iron. J. P. Chilton and U. R. Evans. *Iron and Steel Institute, Journal,* v. 181, Oct. 1955, p. 113-122 + 2 plates.

Investigates differences between corrosion behavior of wrought iron and steel, and means by which the iron may be used to best advantage. Diagrams, tables, graphs, photographs. 28 ref. (R general, Fe)

462-R. (French.) **Influence of the Surface State on the Corrosion of Aluminum.** Pierre A. Jacquet. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 7-22.

Tests on cold worked and annealed aluminum described to compare superficial attack of mechanically and electrolytically polished specimens in contact with salt spray, and alkaline and acid solutions. Tables, micrographs, photographs. 12 ref. (R11, Al)

463-R. (French.) **Influence of Purity on the Corrosion of Super-Purity Aluminum.** Frédéric Montariol. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 23-25; disc., p. 26.

Hydrochloric acid (15%) used to test aluminum of purity greater than 99.998%. Photographs. 6 ref. (R11, Al)

464-R. (French.) **On the Behavior of Aluminum Exposed to a Town Atmosphere for Many Years.** Carlo Panseri and Anna Gragnani. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 27-36; disc., p. 36-37.

Chemical analyses, mechanical tests, micrographic examinations made on sheet taken from two 50-yr. old roofs in Rome. Photographs, micrographs, tables. 6 ref. (R3, Al)

465-R. (French.) **The Galvanic Couple, Aluminum-Graphite, in the Corrosion of Light Alloys.** Anna Prati. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 39-47; disc., p. 47.

Results of tests on super-purity aluminum, either insulated or short-circuited with graphite electrode. Photographs, micrographs, tables, graphs, diagrams. 7 ref. (R11, Al)

466-R. (German.) **Electron Microscopy and Electron Diffraction in the Service of Corrosion Research.** W. Feitknecht. *Umschau in Wissenschaft und Technik,* v. 55, no. 18, Sept. 1955, p. 556-558.

Research on the structure of minute corrosion deposits on zinc in

sodium chloride solution. Micrographs, photograph. (R11, M21, Zn)

467-R. (German.) **The Chemical Corrosion Behavior of Nonferrous Metals With Respect to the Alkaline Mono-Fluorides and Alkali Hydrofluorides. I. Chemical Corrosion Behavior of Nonferrous Metals With Respect to Solutions of Alkaline Monofluorides and Alkali Hydrofluorides.** W. Köhler. *Werkstoffe und Korrosion,* v. 6, no. 10, Oct. 1955, p. 478-486.

Describes investigation method, material used, testing data and results. Photographs, tables. 18 ref. (R5, EG-a)

468-R. (Russian.) **Electrochemical Behavior of Cadmium in Acid Solutions of Electrolytes. Influence of Haloid Potassium Salt Additions.** Ia. M. Kolotyrkin and L. A. Medvedeva. *Zhurnal fizicheskoi khimii,* v. 29, no. 8, Aug. 1955, p. 1477-1485.

Relation of cadmium solubility to concentration of potassium iodide in sulfuric acid solution. Cathode and anode polarization curves. Graphs, tables. 18 ref. (R5, Cd)

469-R. The Welding of Type 347 Steels. The Results of Nitric Acid and Copper Sulfate-Sulfuric Acid Tests on Modified Type 347 Weld Deposits. Lorin K. Poole. *Arcos Corporation (U. S. Atomic Energy Commission),* NYO-3499, July 1955, 23 p.

Five variations in composition tested to determine suitability for replacing standard composition. Micrographs, tables. 7 ref. (R11, K1, SS)

470-R. An Unusual Case of Corrosion of Aluminum Conduit in Concrete. T. E. Wright. *Engineering Journal,* v. 38, Oct. 1955, p. 1357-1362.

Corrosion of conduit, embedded in a concrete floor, shown to result from calcium chloride in the concrete mix, together with the presence of galvanic currents from contact with embedded steel. Both must be present to allow such corrosion. Photographs, tables, graph. (R1, R6, Al)

471-R. The Kinetics of the Underwater Corrosion of Powdered Magnesium. Eli S. Freeman and Saul Gordon. *Journal of Physical Chemistry,* v. 59, Oct. 1955, p. 1009-1015.

Investigation of atomized and ground powder in presence of nitrogen, helium, carbon dioxide, hydrogen and oxygen. Tables, graphs. 5 ref. (R4, R6, Hll, Mg)

472-R. Compressor Station Equipment Corrosion Problems and Remedies. J. C. Berringer. *Pipe Line News,* v. 27, Oct. 1955, p. 55-56, 58-59.

Corrosion mechanism in and preventive measures for equipment using the open water cooling system, after-cooling coils and water tanks, and problems of hydrogen sulfide occurring in gas. (R4, R9)

473-R. (German.) **Corrosion and Corrosion Prevention of Electrical Equipment. I.** B. Müller. *Energietechnik,* v. 5, no. 9, Sept. 1955, p. 406-412.

Causes and mechanisms of corrosion, erosion and cavitation; bacterial corrosion and influence of temperature; method of corrosion measurement and its prevention. Diagrams, micrographs, table. (R general)

474-R. (German.) **Copper-Nickel Alloys as Corrosion Resistant Materials.** A. Schimmel. *Energietechnik,* v. 5, no. 9, Sept. 1955, p. 413-414.

Corrosion resistance of nickel-containing alloys compared with brass and bronze materials as applied to heat transfer purposes. Micrographs. (R general, Cu)

475-R. (German.) **Electrochemical Behavior of Copper-Gold Alloy and the Mechanism of Stress-Corrosion.** Heinz Gerischer and Hans Rickert. *Zeitschrift für Metallkunde,* v. 46, no. 9, Sept. 1955, p. 681-689.

Current density curve of the alloy, influence of mechanical load, stress-corrosion under anodic current, localization of corrosion. Graphs, diagrams, table. 13 ref. (R1, Au, Cu)

S

Inspection and Control

318-S. Roll-Setting Method of Automatic Control of Gauge in Hot and Cold Rolling Mills. R. B. Sims and K. H. Slack. *Institution of Mechanical Engineers, Proceedings,* v. 169, no. 11, 1955, p. 255-262; disc., p. 262-268 + 2 plates.

Controller, experiments which demonstrate that method is capable of consistent rolling to close tolerances. Graphs, table, diagrams, photographs. 8 ref. (S14, F23)

319-S. The Use of Artificially Radioactive Isotopes in the Study of the Processes of the Production of Steel and Iron. A. M. Samarin. *International Conference on the Peaceful Uses of Atomic Energy,* A/CONF.8/P/707, July 1955, 28 p. (Translated from the Russian.)

Applicable in determining thermodynamic functions and kinetics of metallurgical reactions and in disclosing mechanism of separation of admixtures in solidification of steel and alloys. Diagrams, graphs. 33 ref. (S19, P12, N12, ST)

320-S. Statistical Methods in Metallurgy. Ulick R. Evans. *Metallurgia,* v. 52, no. 311, Sept. 1955, p. 107-111.

Validity tests of data; reproducibility of results; histograms and other forms of graphical representation. Graphs. 10 ref. (S12)

321-S. Standard Stainless Steels, Wrought and Cast. *Metal Progress,* v. 68, Oct. 1955, p. 104B.

Types, composition, S.A.E. designations. Table. (S22, SS)

322-S. Influence of Forging on Phosphorus Segregation in Steel. Use of Radio-Active Isotopes. A. Kohn and J. Doumerc. *Metal Treatment and Drop Forging,* v. 22, Sept. 1955, p. 387-394.

Auto-radiographic techniques used to establish magnitude of segregation in ingot containing 0.42% carbon and 0.21% phosphorus. Photographs, radiographs, diagram, graph. 3 ref. (S19, F22, ST)

323-S. Metal Selector. *Steel,* v. 137, Oct. 10, 1955, 10 p.

Specifications and uses for 542 widely used metals. Tables. (S22, AY, SS, CI, Zn, Ti, Al, Cu, Mg)

324-S. (English.) **The Spectrographic Determination of Germanium in Coal and Flue Dust.** G. J. Pitt and M. F. Fletcher. *Spectrochimica Acta,* v. 7, no. 4, Sept. 1955, p. 214-218.

Good accuracy achieved both with flue dusts containing at least 0.3% and with coal ashes containing at least 25 p.p.m. Table. 10 ref. (S11, Ge)

325-S. (French.) **Study of Some Phenomena Observed on Metallic Specimens Irradiated in the Air by Deuterons of About Three M.E.V.** A. Kohn and J. Doumerc. *Journal de physique et le radium,* v. 16, nos. 8-9, Aug.-Sept. 1955, p. 649-653.

Validity of method for determining traces of carbon in specimens of iron by brief irradiation in a flux of three m.e.v. deuterons. Autoradiograph, graphs, table. 2 ref. (S11, C, Fe)

326-S. (German.) **New Ways of Investigating Gases in Steels.** W. Koch. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 100, nos. 7-8, July-Aug. 1955, p. 225-229.

Determination of carbon monoxide, hydrogen, oxygen and nitrogen; solubility diffusion speed; the relation between the temperature and gas liberation. Graphs, diagrams. (S11, ST)

327-S. (German.) **Further Development in Vacuum Hot-Extraction Analysis.** Heinrich Feichtinger. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 100, nos. 7-8, July-Aug. 1955, p. 230-238.

Hot extraction apparatus for use in conjunction with graphite or high-frequency furnaces. Photographs, diagrams, table. 12 ref. (S11)

328-S. (German.) **Oxygen Determination in Steels.** Michel Olette and Mireille Hanin. *Berg- und hüttenmännische Monatshefte der montanistischen Hochschule in Leoben,* v. 100, nos. 7-8, July-Aug. 1955, p. 238-244.

Data resulting from modification of the existing method of oxygen and nitrogen determination in steel with a reference to work done by U. S. Bureau of Standards. Photographs, diagrams, tables. 11 ref. (S11, ST)

329-S. (German.) **Scheme Proposed for the Unification of Auxiliary Measuring Instruments in the Roll-Turning Department.** Otto Müller and Gerhard Beier. *Metallurgie,* v. 5, no. 6, June 1955, p. 203-205.

Explanation of the working and application of standard percentage tables. Diagrams, table. (S22, G11)

330-S. (German.) **Influence of Material, Machine, and Tools on the Surface Condition of Gear Tooth Flanks. II. Roughness of the Tooth-Cutting Tools.** W. Hagen. *VDI Zeitschrift,* v. 97, no. 27, Sept. 21, 1955, p. 956-959.

Data of roughness measurement; instrument applied. Micrographs, photographs. 5 ref. (S15)

331-S. (Hungarian.) **Practical Problems of the X-Ray Testing of Steel Castings.** Rezsö Kottra. *Kohaszati lapok,* v. 10, no. 9, Sept. 1955, p. 197-205.

Testing methods on basis of the literature; gamma ray testing; practical suggestions on examination of thin and thick-walled castings. Photographs, diagrams, radiographs. 6 ref. (S13, CI, ST)

332-S. (Hungarian.) **Determination of the Lead Content in High-Speed Steels.** Imre Bozsai and Karolyné Szabados. *Kohaszati lapok,* v. 10, no. 9, Sept. 1955, p. 423-424.

Improvement of existing methods; details of the process. Tables. (S11, Pb, TS-m)

333-S. Antidotes for Sleeve Bearing Failures. Anthony F. Kaminskas. *Iron and Steel Engineer,* v. 32, Oct. 1955, p. 82-89; disc., p. 89.

Considers failures due to improper maintenance, which can be more specifically attributed to insufficient clearance, poor alignment, dirt, overloading and high temperature. Photographs, diagrams, graphs. (S21, SG-c)

334-S. (English.) **A Method for Isolating Carbide in Carbon and Low Alloy Steel.** Helfrid Modin. *Jernkontorets annaler,* v. 139, no. 8, 1955, p. 516-520.

Carbide particles, extracted by dissolving the ferrite in 50% nitric acid, are suitable for the study of

their appearance, lattice structure and chemical composition. Electron microscopic examination showed the carbide had not been noticeably attacked. 2 ref. (S11, M27, AY, CN)

335-S. (Spanish.) **New Techniques of Chemical Analysis in Metallurgy.** Ramon Suarez Acosta. *Instituto del hierro y del acero*, v. 8, no. 36, Apr.-June 1955, p. 171-183.

Describes new reagents and new instrumental, optical, potentiometric and electrolytic methods for high-speed and precision chemical analysis of various metallurgical processes. Table, graphs, diagrams. 54 ref. (S11)

336-S. (Spanish.) **Testing of Materials by Ultrasonic Methods. II.** Jose Ors Martinez. *Instituto del hierro y del acero*, v. 8, no. 36, Apr.-June 1955, p. 184-201.

General methods used for generating ultrasonics and some studies conducted on measuring rates of propagation and determining elastic constants. Principal types of apparatus now in use for localizing defects in acoustically conductive materials, their classification and interpretation. Diagrams, tables, photographs, oscillograms. 24 ref. (S13)

337-S. The Sensitivity of Electron Diffraction as a Means of Detecting Thin Surface Films. I R. C. Newman and D. W. Pashley. *Philosophical Magazine*, v. 46, 7th ser., no. 380, Sept. 1955, p. 927-940 + 4 plates.

Radio-active technique is used to determine thickness of silver bromide and copper deposited on smooth surfaces of silver single crystals. Tables, graph, photographs. 11 ref. (To be continued.) (S14, Cu, Ag)

338-S. (Czech.) **Potentio-Coulombometric Determination of Small Quantities of Carbon in Steels and Carbides.** Miroslav Sicha. *Hutnické listy*, v. 10, no. 9, Sept. 1955, p. 535-542.

Very sentitive method successfully employed in mirco-laboratory for routine analyses. Table, diagrams, graph. 5 ref. (S11, C-n, ST)

339-S. (Czech.) **Mathematical Statistics in Metallurgy.** J. Janko and M. Knotek. *Hutnické listy*, v. 10, no. 9, Sept. 1955, p. 542-549.

Explains use of statistics in various processes and fundamental types of distribution. Graph. 5 ref. (S12)

340-S. (French.) **Automation in Industrial Measuring.** *Métallurgie et la construction mécanique*, v. 87, no. 9, Sept. 1955, p. 713, 715-717.

General outline of the essential points of measuring in production processes, applications and classification of types of measurements. Photographs, diagrams. (To be continued.) (S14)

341-S. (German.) **Investigation of the Capacity of a 15-M.E.V. Betatron in the Radiography of Steel.** Hermann Möller, Walter Grimm and Helmut Weeber. *Archiv für das Eisenhüttenwesen*, v. 26, no. 10, Oct. 1955, p. 603-609.

Includes graphs, photographs. (S13, ST)

342-S. (German.) **Present State of the Temperature Control of Steel Melts and During Pouring.** Kurt Guthmann. *Stahl und Eisen*, v. 75, no. 20, Oct. 6, 1955, p. 1317-1324.

Immersion thermocouples, insulation defects, calibration, optical pyrometry, true tapping and pouring temperatures, alloy additions and radiating power of melt. Graphs, diagrams, photographs, table. 13 ref. (S16, D9, ST)

343-S. (German.) **X-Ray Spectroanalysis by Use of Counting Tube.** Gerhard Lang. *Zeitschrift für Metallkunde*, v. 46, no. 9, Sept. 1955, p. 616-620.

Absorption analysis, devices for X-ray spectro-analysis, analytical methods used in industry. Photographs, diagram, graph. 19 ref. (S11)

344-S. (Russian.) **Spectral Analysis of Titanium for Determination of Impurity Content.** Sh. G. Melamed. *Zavodskaia laboratoriia*, v. 21, no. 9, 1955, p. 1066-1070.

Preparation of standard specimens, determination of volatile impurities, general procedures. Tables, diagram, spectrographs. 3 ref. (S11, Ti)

T

Applications of Metals in Equipment

183-T. Applications of Indium Antimonide. I. M. Ross and E. W. Saker. *Journal of Electronics*, v. 1, ser. 1, Sept. 1955, p. 223-230.

Applications as radiation detector, filter material or thermoelectric generator in electronic and radiation equipment. Graph, diagrams. 16 ref. (T1, In, Sb)

184-T. High Nitrogen Cast Austenitic Steels. John F. Carlson and Victor F. Zackay. *Journal of Metals*, v. 7; *American Institute of Mining and Metallurgical Engineers, Transactions*, v. 203, Oct. 1955, p. 1112-1113.

Gas turbine engines in automobile industry need low-cost nonstrategic alloy for service between 1200 and 1400° F. Graphs. (T21, SS)

185-T. Review of Ferrous Wire Qualities Appropriate to Chain Making. II. P. L. Lewis. *Wire Industry*, v. 22, Sept. 1955, p. 873 + 5 pages.

Covers carbide precipitation, strain-age embrittlement, grain size, annealing, chemical analysis, importance of fully killing steel, causes of faulty wire chain, intercrystalline carbide films, faulty welds, surface condition, various steel chains. Photographs, graph, micrographs, diagrams. 10 ref. (T7, ST)

186-T. Design and Construction of Transformers for the Steel Industry. W. Walter Renberg. *Iron and Steel Engineer*, v. 32, Oct. 1955, p. 66-75.

Attempts to obtain desirable features of low losses, low temperature rise, large safety factors and machanical stability are possible only at the expense of size, weight and cost. Photographs, diagrams, table. 6 ref. (T1, ST)

187-T. Aluminum in Fractional Horsepower Motors. D. J. Harbour. *Modern Metals*, v. 11, Oct. 1955, p. 60, 62.

Discusses magnet wire, wire connectors, redesign and combining copper and aluminum wires. Photographs, table. (T25, Cu, Al)

188-T. The Modern Galvanized Sheet and Its Uses. Francis H. Smith. *Sheet Metal Industries*, v. 32, no. 342, Oct. 1955, p. 735-740, 744.

Sheet produced by modern continuous process, with details of its fabrication into finished parts. Illustrates its adaptability by reference to its high-grade finish and workability. Photographs, diagram, table, micrographs. (T general, L16, ST, Zn)

189-T. High-Strength Steels for Aircraft Structures. Edward A. Loria. *Western Machinery and Steel World*, v. 46, Oct. 1955, p. 72-76.

Steels must withstand the higher operating temperatures of power plants and kinetic heating of air at supersonic speeds. Tables, graphs. 6 ref. (T24, AY)

190-T. Functions of Reactor Materials. E. M. Simons. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 1-8.

Metallurgical requirements of materials for fuel and structural elements, control, moderation, reflection, shielding. Table. (T25)

191-T. (English.) **Aluminum Applications in the Alcoa Building.** William T. Ennor. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 239-246.

Describes outside walls, partitions, windows, air conditioning, heating by radiation, plumbing, electrical circuits and architectural design. Photographs, micrograph. 10 ref. (T26, Al)

192-T. (English.) **Aluminium Cans for Processed Food Products.** A. V. Lovell. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 273-292; disc., p. 292.

Shows results of canning vegetables and fruit using deep cans, lacquered after drawing. Photographs, tables, diagrams, graphs. (T29, Al)

193-T. (English.) **Why Aluminum Is Used in Its Major Applications in the United States.** George Perkins. Paper from "Congres International de l'Aluminium". V. II. La Société d'Edition et de Documentation des Alliages Légers, p. 315-322; disc., p. 322-323.

Reasons for growth of use include characteristics of metal and its alloys, namely, lightness, electrical and thermal conductivity, good corrosion resistance, lack of toxicity, malleability, reflectivity, high tensile strength and castability. (T general, Q general, Al)

194-T. (French.) **Transposition of Materials and Construction Scales in the Fabrication of Large Structures.** Raymond de Fleury. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 207-216.

Transposition of dimensions depends on properties of light metal to be used. Graphs. 6 ref. (T26, EG-a)

195-T. (French.) **Aluminum in Italian Naval Rebuilding.** Richard Struss. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 255-264; disc., p. 264.

Since end of second world war, more important merchant ships built or rebuilt contain up to 200 tons of light alloys, especially aluminum-magnesium. Tables, photographs, diagram. (T22, EG-a, Al, Mg)

196-T. (French.) **Trends in the Use of Aluminum for Packaging in Italy.** Eugenio Hugony. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 265-272; disc., p. 272.

Uses include foil, collapsible tubes, milk cans with internal cladding, mastic sealed tubes and foil laminated with polyethylene. Photographs, micrograph, tables. (T10, Al)

197-T. New Super Alloy Speeds Jet Progress. R. W. Guard and T. A. Prater. *Iron Age*, v. 176, Oct. 20, 1955, p. 116-118.

Jetalloy 1570, for aircraft gas turbine buckets, has good forgeability and superior fatigue strength at 1500° F. Tables, photographs, graphs. (T24, F22, Q7, SG-h)

198-T. Quality Control in the Production of Aluminum Foil. O. H.

Bishop. *Light Metal Age,* v. 13, Oct. 1955, p. 14-17, 33, 38.

Considers household foil because it encompasses general pattern of operations and is convenient for sampling. Photograpns, graph. 5 ref. (T10, S12, Al)

199-T. The Outlook for Light Metals Use. Douglas Watson and Jack L. Davies. *Light Metal Age,* v. 13, Oct. 1955, p. 24-26, 39.

Emphasis on applications of aluminum and magnesium. Photographs. (T general, EG-a, Al, Mg)

200-T. Development of a Welded Aluminum Bus for Substations. C. E. Asbury and C. J. Hartman. *Power Apparatus and Systems,* 1955, no. 20, Oct., p. 834-838; disc., p. 838-839.

Provides appreciable saving in material and in installation labor for major stations. Diagrams, photographs. 6 ref. (T1, Al)

201-T. Aluminum Widely Used in Power Switchgear. J. L. Talento. *Power Apparatus and Systems,* 1955, no. 20, Oct., p. 839-843; disc., p. 843-844.

Applications vary from small rivets and hardware to important structural and current carrying parts. Photographs, tables. 1 ref. (T1, Al)

202-T. The Use of All-Aluminum Conductor on Transmission Lines. E. M. Wright and E. G. Lambert. *Power Apparatus and Systems,* 1955, no. 20, Oct., p. 849-853; disc., p. 853-854.

Economic advantages over other types of conductors. Graphs, tables, diagram. (T1, Al)

203-T. Chrome Carbide for Hot Extrusion of Brass and Copper. A. Earle Glen. *Wire and Wire Products,* v. 30, Oct. 1955, p. 1230-1231, 1294.

Chemical composition, physical properties, microstructure, advantages of using. Photographs, diagrams. (T5, G5, Cu, C, Cr)

204-T. Mineral-Insulated Metallic-Sheathed Cables. G. S. Eager, Jr., and S. P. Lamberton. *Wire and Wire Products,* v. 30, Oct. 1955, p. 1240 + 6 pages.

This 600-volt cable is composed of copper, for conductors and seamless outer sheath, and compressed magnesium oxide for insulation. Tables, graphs. 2 ref. (T1, Mg, Cu)

205-T. Aluminum and Its Alloys. N. F. Ritchey and C. M. Craighead. Paper from "Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 9-40.

Because of its low thermal neutron absorption cross section and corrosion resistance, aluminum warrants favorable consideration as a structural material and as a protective coating for fuel elements. Its low melting point, decreased high-temperature strength, and lowered corrosion resistance of most of the higher strength alloys limit its use to low-temperature applications. Tables, graphs. (T26, Al)

206-T. (English.) Experience of the Application of Aluminum for Structural Purposes. W. D. Devereux, J. M. Smith and E. J. Pike. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 199-205; disc., p. 205.

Principles by which British engineers have been guided in the design of light alloy sections used for framework and structures of buildings having very large bays. Photographs. (T26, Al)

207-T. (Czech.) Unalloyed Compound Cast Iron Rolls for Rolling Mills. Otto Necas and Vojtech Krhut. *Slévarenstvi,* v. 3, no. 9, Sept. 1955, p. 260-265.

Production of cast iron rolls without the use of charcoal pig iron. Production of rolls by interrupted pouring is more convenient than by continuous pouring. Photographs, diagrams, micrographs. 10 ref. (T5, E23, CI)

208-T. (French.) Lightening of Metallic Construction. A. Ogus. *Métallurgie et la construction mécanique,* v. 87, no. 9, Sept. 1955, p. 693, 695, 697, 699.

Examines question of quality of metal, use of folded pieces, light alloys and welded and riveted construction, from the point of view of having a lighter metallic construction. Diagram, graphs. (T26, Al)

209-T. (French.) Achievements and Trends in the Use of Light Alloys for Architecture. Romolo Donatelli. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 231-328; disc., p. 238.

Recalls light alloy characteristics of interest in architecture. Photographs, diagrams, table. (T26, Al, EG-a)

210-T. (French.) Use of Aluminum in the Electrotechnology of Italy. Arrigo Perrone. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 293-301.

Statistical account of aluminum consumption; characteristics of alloys used. Graphs, photographs, table, diagrams. (T1, Al)

211-T. (French.) Light Metal Bearings and Their Uses. Alfred Buske. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 305-314.

Advantages include high thermal conductivity and low modulus of elasticity. Discusses housings and lamination for different purposes. Photographs, micrographs, graphs, diagrams, table. (T7, Al, SG-c)

212-T. (Book.) Chemical Processing and Equipment. 302 p. U. S. Atomic Energy Program, U. S. Government Printing Office, Superintendent of Documents, Washington 25, D. C. $2.00.

Study of work on reactor fuel elements at the Idaho Chemical Processing Plant. (T25, T29, EG-h)

213-T. (Book.) Magnetic Materials in the Electrical Industry. P. R. Bardell. 288 p. 1955. Philosophical Library, 15 East 40th Street, New York 16, N. Y. $10.00

Considers theories, permanent magnet materials, properties of soft materials, recording, testing of materials, transductors, and transducers. (T1, SG-n, p)

214-T. (Book.) The Reactor Handbook. J. F. Hogerton and R. C. Grass, editors. v. III. Materials. AECD-3647. 610 p. 1955. Technical Information Service, U. S. Atomic Energy Commission. Available from U. S. Government Printing Office, Superintendent of Documents, Washington, D. C. $3.50.

Functions of reactor materials and the properties of some metals and their alloys, the rare earths, high-cross-section materials, cements, concretes, stainless steels, and other significant materials. (T25)

215-T. (Book.) Steel Designers' Manual. Charles Gray, Lewis E. Kent, W. A. Mitchell, and G. Bernard Godfrey. 909 p. 1955. Crosby Lockwood and Son Ltd., 26 Old Brompton Road, London SW7, England.

Preparation of present-day knowledge on design of steel framed buildings, and presentation of complete data, tables, and diagrams for use by the practicing designer. (T26, ST)

V

Materials

General Coverage of Specific Materials

289-V. Alloys for Use at High Temperatures. W. Betteridge. *British Journal of Applied Physics,* v. 6, Sept. 1955, p. 301-306.

Properties necessary in metallic materials intended for service at high temperatures, characteristics of nickel-base alloys for such applications. Properties discussed include corrosion, creep, fracture resistance. Graphs, micrographs, photographs. 11 ref. (Ni, SG-h)

290-V. Zirconium—Metal With a Future. Frank Charity. *Consulting Engineer,* v. 6, Oct. 1955, p. 56-59.

Refining, fabrication, applications, properties. Photographs, graphs. (Zr)

291-V. Lithium. Daniel P. Eigo, James W. Franklin and George H. Cleaver. *Engineering and Mining Journal,* v. 156, Sept. 1955, p. 75-89.

Facts and figures of value to mines, mill man and investors in nuclear age. Based on peacetime industrial applications alone, lithium industry is showing healthy expansion. Photographs, map, tables, graph, flowsheet. (Li)

292-V. Selenium. E. M. Elkin. *Canadian Metals,* v. 18, Oct. 1955, p. 30, 32, 34-35.

Occurrence, properties, recovery, applications. Photographs. (Se)

293-V. Alnico Magnets for New Meter. H. Wilkinson. *Canadian Metals,* v. 18, Oct. 1955, p. 42-44, 46.

Casting, heat treatment, grinding, testing. Photographs. (SG-n)

294-V. Beryllium and Its Alloys. J. T. Stacy. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 55-94.

Physical, mechanical and metallurgical aspects of use in atomic energy development. Disadvantages are low ductility, fabrication troubles, high corrosion rate, cost. Flowsheet, tables, graphs. (T25, Be)

295-V. Bismuth. M. C. Udy. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 107-111.

Relatively low melting point and a low-absorption cross section of bismuth suggests its use as a liquid fuel-carrying medium in nuclear reactors or as a liquid-metal coolant. Tables. 2 ref. (T25, Bi)

296-V. Carbides. M. W. Mallett and V. M. Sheipline. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 113-122.

Used as refractories, fuels, radiation shields or structural materials. Most important properties of carbides are high hardness and good thermal stability. Tabulation of physical and chemical constants and preparation. Tables. (T25, C-n)

297-V. Lithium and Its Alloys. M. W. Mote and P. D. Frost. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 169-172.

Physical, chemical and mechanical properties. Refers to alloy properties. Table (Li)

298-V. Magnesium and Its Alloys. M. W. Mote and P. D. Frost. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 173-190.

This lightest of structural metals has a low neutron-absorption cross section but no present large-scale application. Alloys, mechanical, physical and metallurgical qualities. Tables. (Mg)

299-V. Molybdenum and Its Alloys. R. M. Parke, J. A. Van Echo, W. E. Few and L. E. Olds. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service. U. S. Atomic Energy Commission, p. 191-214.

Shows promise as a material of construction for high stress above 1600° F. Economic, physical, mechanical, metallurgical data. Tables, graphs. (T25, Mo)

300-V. Nickel and Its Alloys. D. J. Daniels and A. M. Hall. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 215-234.

The alloy strength, high-temperature strength, and corrosion resistance of nickel maintain its demand, despite a rather high neutron-absorption cross section. Properties are listed and described. Tables. (Ni)

301-V. Plutonium and Its Alloys. E. R. Lette and A. S. Coffinberry. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 235-242.

Only foreseeable applications are as weapon material and in reactors. Properties listed, health hazards discussed. Tables. 6 ref. (T2, T25, A7, Pu)

302-V. Rare Earths. M. C. Udy. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 243-254.

Metals are finding use as reactor controls because of their unusually high neutron-absorption cross sections (up to 44,000 barns). Availability, applications, properties. Tables. 1 ref. (T25, EG-b)

303-V. Stainless Steels. Erwin Eichen, J. H. Jackson, W. K. Boyd and R. S. Peoples. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647, Technical Information Service, U. S. Atomic Energy Commission, p. 263-297.

Applications in nuclear technology which are quite extensive, because of their elevated temperature strength and good corrosion resistance. Physical, mechanical, metallurgical, corrosion properties. Tables, graphs. 1 ref. (T25, SS)

304-V. Titanium and Its Alloys. H. R. Ogden. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 345-372.

Quite similar to zirconium in properties, but with a higher neutron-absorption cross section, titanium demand is based on favorable strength-weight ratio. Presents metallurgical, physical, mechanical properties. Tables, graphs, flowsheet, diagrams. (T25, Ti)

305-V. Tungsten. R. B. Fischer. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 373-381.

Economics, physical, mechanical, metallurgical properties. Tables, graph. (W)

306-V. Uranium and Its Alloys. H. A. Saller. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 383-436.

This is the basic fuel for nuclear reactors and has few other uses. Its apparent scarcity is misleading. Details of its technology. Flowsheets, tables, graphs, diagrams, micrographs. (T25, U)

307-V. Vanadium and Its Alloys. J. R. Keeler. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 437-457.

Properties of this highly reactive, high-melting point metal and its alloys. May serve as a structural material in fast reactors. Tables, graphs, diagrams. (T26)

308-V. Zirconium and Its Alloys. R. W. Dayton. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 459-504.

Because of its nuclear properties, this metal, when free of hafnium, has extensive applications as a structural material in reactor design; the core of the first submarine thermal reactor is zirconium. Major limitations are loss of strength and corrosion resistance at high temperatures. Tables, graph. (T26, Zr)

309-V. High-Cross-Section Materials. M. C. Udy. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 505-531.

Technology of the metals boron, cadmium, cobalt, hafnium, mercury, rhodium and silver. Tables. (B, Cd, Co, Hf, Hg, Rh, Ag)

310-V. Cobalt-Base Alloys. Erwin Eichen and J. H. Jackson. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 533-557.

Cobalt alloys, the "superalloys" for stress and shock resistance at high temperature, find their niche in nuclear reactors despite cobalt's high termal-neutron absorption. Alloy characteristics are presented. Tables, graphs. (T25, Co, AY)

311-V. (English.) Recent Advances in Aluminum Technology in the United States. P. D. Frost, O. J. Huber and C. H. Lorig. Paper from "Congres International de l'Aluminium". v. II. La Société d'Edition et de Documentation des Alliages Légers, p. 185-195.

Important development in past two years, including the Alcoa office in Pittsburgh, heavy press program for aircraft, sintered powder, relationship between plastic properties of copper alloys and mean free path between particles of $CuAl_2$ disperse phase, high-strength alloys, bearing alloys, electrodeposition. Photographs, graphs, tables, diagram. 24 ref. (T general, Al)

312-V. (German.) Thermal-Bimetals. W. Rienäcker. *Schweizer Archiv für angewandte Wissenschaft und Technik*, v. 21, no. 9, Sept. 1955, p. 289-295.

Production of bimetals for technical application, composition, heat conductivity, corrosion prevention. Graphs, table. 10 ref. (SG-a)

313-V. Hiduminium RR.58. Heat Treatable Aluminum Alloy. *Alloy Digest*, no. Al-34, Nov. 1955.

Composition, physical constants, properties, heat treatment, machinability, workability, weldability, specification equivalents, general characteristics, forms available, applications. (Al)

314-V. Ampco Metal-16. Aluminum Bronze. *Alloy Digest*, no. Cu-33, Nov. 1955.

Composition, physical constants, properties, machinability, weldability, corrosion resistance, general characteristics, forms available, applications. (Cu)

315-V. Dowmetal HK31XA. High Temperature Magnesium Alloy. *Alloy Digest*, no. Mg-20, Nov 1955.

Composition, physical constants, properties, heat treatment, machinability, weldability, specification equivalents, general characteristics, forms available, applications. (Mg)

316-V. AISI—E3310. Chromium-Nickel Carburizing Steel. *Alloy Digest*, no. SA-35, Nov. 1955.

Composition, properties, heat treatment, machinability, workability, weldability, specification equivalents, general characteristics, forms available, applications. (AY)

317-V. Carpenter Stainless No. 440B. High-Carbon Chromium Stainless Steel, Type 440B. *Alloy Digest*, no. SS-36, Nov. 1955.

Composition, physical constants, properties, heat treatment, machinability, workability, weldability, corrosion resistance, pickling treatment, specification equivalents, general characteristics, forms available, applications. (SS)

318-V. U.S.S. 9% Cr-1% Mo. Corrosion Resistant Steel. *Alloy Digest*, no. SS-37, Nov. 1955.

Composition, physical constants, properties, heat treatment, machinability, workability, weldability, corrosion resistance, specification equivalents, general characteristics, forms available, applications. (SS)

319-V. Rem-Cru A-110AT. High-Strength Titanium Alloy. *Alloy Digest*. no. Ti-8, Nov. 1955.

Composition, physical constants, properties, fatigue strength, heat treatment, machinability, corrosion resistance, cleaning, workability, weldability, general characteristics, forms available, applications. Graphs. (Ti)

320-V. N Graph-Mo. Graphitic Tool & Die Steel. *Alloy Digest*, no. TS-40, Nov. 1955.

Composition, properties, heat treatment, machinability, grinding, workability, general characteristics, forms available, applications. (TS)

321-V. How to Work Superalloys. Anderson Ashburn. *American Machinist*, v. 99, Oct. 24, 1955, p. 137-144.

Data on properties, heat treatment, forging, welding and machining tabulated for 34 alloys. Tables, graph, diagrams. (Q general, J general, F22, K general, G17, SG-h)

322-V. Thorium and its Alloys. J. R. Keeler. Paper from "The Reactor Handbook. v. III. Materials". AECD-3647. Technical Information Service, U. S. Atomic Energy Commission, p. 299-344.

Interest in thorium is based on its being a source of uranium^{233}. Physical, mechanical, metallurgical properties presented. Tables, graphs. (Th)

323-V. (Pamphlet.) Titanium. 16 p. 1955. U. S. Government Printing Office, Superintendent of Documents, Washington, D. C.

Staff report of a special senate subcommittee on minerals, materials, and fuels economics regarding recent experiences of titanium producers and fabricators. (Ti)

324-V. (Book.) Zirconium & Hafnium. A Bibliography. Gordon C. Williams, E. G. Baker, Jr., E. W. Holzknecht and R. G. Moody. NYO-1008. 236 p. 1950. U. S. Atomic Energy Commission, Technical Information Service, Oak Ridge, Tenn.

Covers articles appearing in *Chemical Abstracts* from 1907 through 1948. (Zr, Hf)

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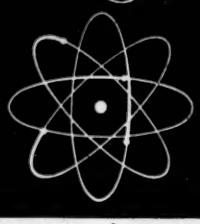

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West

MATERIALS ENGINEER: Individual under 35 years of age wanted for position with excellent government research laboratory in California. Applicants having training and/or laboratory experience in metallurgical, mechanical, environmental or chemical evaluation of diverse materials (metals, plastics, paper products, paint, etc.) are invited to send outline of qualifications, personal background and educational summary. Box 12-60.

PACKAGING ENGINEER: Do you know someone with experience in field of package engineering, particularly one who has tested or evaluated shipping containers, metal, fiberboard, wooden boxes, cushioning material, preservatives, etc.? Position open with government research laboratory in California that designs, develops and tests prototype containers for ordnance weapons. Applicants are invited to send outline of qualifications, personal background and educational summary. Box 12-65.

INDUSTRIAL FURNACE ENGINEERS (Sales and Design): To keep pace with the growth of business, a long-established Southern California furnace manufacturer has openings for (1) an engineer to design gas-fired industrial furnaces and (2) sales engineers to sell gas and/or electric furnaces in either Southern California or the Northwest. If you are well qualified for either type of position, please send complete resume. Box 12-130.

POSITIONS WANTED

PHYSICAL METALLURGIST: Married, family. B. S. degree in metallurgical engineering. Five years total experience; two years in wire mill with plain carbon, medium alloy and stainless steel background; two years in aircraft and automotive industry in research and development of high-temperature alloys, one year experience in development work on titanium, aluminum and ultra-high-strength level steels in aircraft industry. Box 12-45.

PROCESS ANALYST: A.B. degree in chemistry, physics, mathematics, A.M. degree in psychology, sociology. Duties included writing of process bulletins, mechanical testing of aircraft fasteners, tensile testing of plastic materials, aluminum and magnesium and titanium alloys, steels, brasses, copper. Compression testing, flexural testing, metallography. Desires to relocate in or near Dayton, Ohio. Box 12-50.

CHIEF METALLURGIST: Desires position as technical development executive. Age 41. Six years as product metallurgist in steel mill handling metallurgical practices, four years as commissioned officer in Engineer Corps, ten years experience in A-1 diversified manufacturing plant as chief metallurgist. Familiar with ferrous and nonferrous materials. Detailed resume on request. Box 12-55.

DIRECTOR OF RESEARCH: With 20 years excellent experience in both fundamental and applied research in metallurgy and materials. Creative thinker and doer as evidenced by 30 papers and 10 patents and patent applications. Experienced in leading research teams and organizations. Ph.D. in metallurgy, and M.S. and B.S. degrees in chemistry. Age 43. Box 12-70.

METALLURGICAL ENGINEER: Age 34, B.S. degree, veteran. Practical experience in heat treating, extractive metallurgy, shipping ore, marine engineering plants. Seven years diversified supervision. Sales and vendor contact in Europe. Wants application, sales or production position in metallurgical or metallurgical equipment industry, preferably leading to foreign service. Box 12-75.

METALLURGICAL CHEMIST: With long experience. Has permission of employer to use well-equipped laboratory to do outside chemical analyses and research. Located Western Massachusetts. Accurate assays, low rates, fast report. Box 12-80.

METALLURGIST: M.S. degree with six years experience in nonferrous metallurgy. Experienced on extrusion problems, alloy development, applied and fundamental research in creep behavior, investigation of phase changes, use of vacuum techniques. Desires position with scope for professional growth. Box 12-85.

FOUNDRY MANAGER — ASSISTANT TO PRESIDENT: Capable executive, age 34, B.S. degree in metallurgical engineering, desires position with progressive-minded organization. Extensive foundry and metallurgical background. Cost, quality and production minded. Instrumental in developing the latest foundry techniques, ductile iron, shell molding, water-cooled cupolas, both acid and basic, all now in successful operation. Box 12-90.

METALLURGICAL ENGINEER: B.S., M.S., Ph.D. degrees, age 27, married, family. Two years industrial and three years research and teaching experience. Desires responsible academic or industrial position, will consider employment in foreign country. Box 12-95.

TECHNICAL WRITER: B.S., M.S. degrees in physics (Case, 1950), graduate metallurgy courses. Has 1½ years heavy technical writing and project engineering in armament field, three years as research metallurgist. Family, age 31, broad interests. Can integrate and analyze information from various sources, report new information, etc. Looking for responsible position. Box 12-100.

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Send account of qualifications to: M. R. Hyslop (Confidential), Managing Editor, Metal Progress, 7301 Euclid Ave., Cleveland 3, Ohio.

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